AD-A143 312 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS THAMES RIVER BASIN NO.. (U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV AUG 80 1/2

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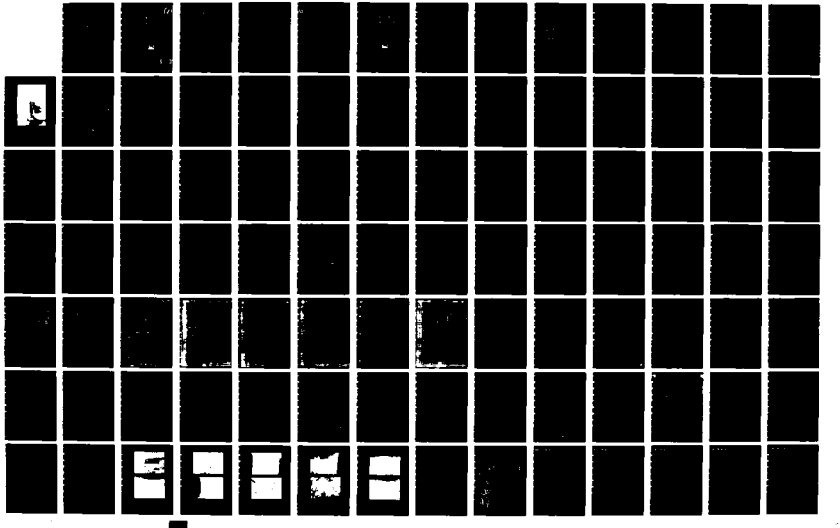

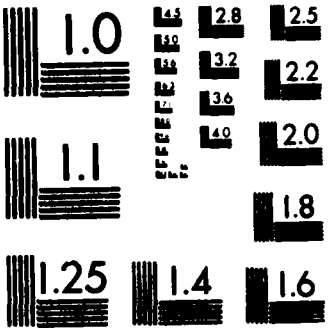

THAMES RIVER BASIN
NORWICH, CONNECTICUT

SPAULDING POND DAM
CT 00202

SPAULDING POND DIKE
CT 01685

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST, 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: CT 00202 ; CT 01685	2. GOVT ACCESSION NO.: AD-A143 312
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Spaulding Pond Dam ; Spaulding Pond Dike NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254	12. REPORT DATE: August 1980 13. NUMBER OF PAGES: 70
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Thames River Basin
Norwich, Conn.
Spaulding Pond Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This dam is an earth embankment approx. 435 ft. in length with an emergency spillway at its right end. It is approx. 30.5 ft. in height and has a maximum design storage of approx. 235 ft. The dike is approx. 740 ft. in length and 18.5 ft. in height. Based upon the visual inspection and past performance, the project is judged to be in good condition. No evidence of instability of either the dam or dike was observed. In accordance with Army Corps of Engineers' guidelines, Spaulding Pond Dam and Dike is classified as a high hazard, small size project.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

JAN 07 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Spaulding Pond Dam (CT-00202) & Spaulding Pond Dike (CT-01685) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, City of Norwich, Norwich, CT.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Division Engineer

Incl
As stated

THAMES RIVER BASIN
NORWICH, CONNECTICUT

SPAULDING POND DAM
CT 00202

SPAULDING POND DIKE
CT 01685

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST, 1980

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

	DAM	DIKE
Name of Project:	SPAULDING POND DAM	SPAULDING POND DIKE
Inventory Number:	CT 00202	CT 01685
State:	CONNECTICUT	CONNECTICUT
County:	NEW LONDON	NEW LONDON
City:	NORWICH	NORWICH
Stream:	SPAULDING POND BROOK	TR-SHETUCKET RIVER
Owner:	CITY OF NORWICH	CITY OF NORWICH
Date of Inspection:	JUNE 2, 1980	JUNE 2, 1980
Inspection Team:	PETER HEYNEN, P.E.	PETER HEYNEN, P.E.
	HECTOR MORENO, P.E.	HECTOR MORENO, P.E.
	THEODORE STEVENS	THEODORE STEVENS
	ROBERT JAHN	ROBERT JAHN

The dam, constructed in 1964 and 1965 to replace an earlier dam which failed in 1963 (Appendix B-4 - B-6), is an earth embankment approximately 435 feet in length with an emergency spillway at its right end. It is approximately 30.5 feet in height and has a maximum design storage of approximately 235 acre-feet. The principal spillway is a drop inlet structure consisting of a reinforced concrete riser to a 30 inch diameter concrete pipe and an impact type energy dissipator at the downstream headwall of the conduit. An orifice at the normal pool elevation, 3.8 feet below the principal spillway, and an 18 inch diameter low-level outlet pipe are also included in the spillway structure. The upstream slope of the embankment is protected by riprap to within approximately 5 feet of the top of the slope; there is a paved roadway on the top of the embankment; and the downstream slope is grassed and contains a toe drain which discharges at the spillway outlet structure. The emergency spillway is paved, with a grassed approach channel and an earth berm on its left side to direct flows away from the downstream slope of the dam.

The dike, built the same time as the dam is approximately 740 feet in length and 18.5 feet in height. The upstream slope is protected by riprap to approximately 3 feet above the normal pool and grassed to the top of the slope. There is a paved roadway along the top of the dike embankment and the downstream slope is grassed and contains a toe drain.

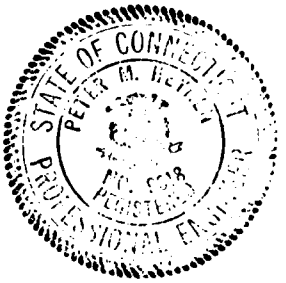
Based upon the visual inspection and past performance, the project is judged to be in good condition. No evidence of instability of either the dam or dike was observed.

In accordance with Army Corps of Engineers' guidelines, Spaulding Pond Dam and Dike is classified as a high hazard, small size project. The test flood range to be considered is from one-half to full Probable Maximum Flood (PMF). The test flood for the project is equivalent to the PMF. Peak inflow to the pond at PMF is 780 cubic feet per second (cfs); peak outflow is 490 cfs with the dam and dike maintaining 3.0 feet of freeboard. The combined spillway capacity to the top of the project is 1142 cfs, which is equivalent to 230% of the routed test flood outflow.

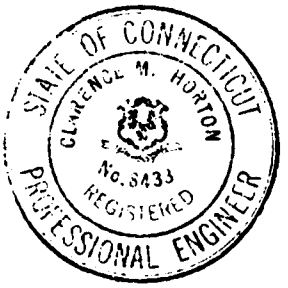
It is recommended that the owner retain the services of a registered professional engineer to investigate the condition of the toe drains for the dam and dike and to determine if scouring at the toe of the dam and erosion of the berm at the right end of the dam would occur during flows over the emergency spillway.

The above recommendations and the remedial operation and maintenance procedures presented in Section 7.3 should be implemented within two years of the owner's receipt of this report.

Peter M. Heynen, P.E.
Project Manager - Geotechnical
Cahn Engineers, Inc.



C. Michael Horton, P.E.
Chief Engineer
Cahn Engineers, Inc.



This Phase I Inspection Report on Spaulding Pond Dam & Dike has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam would necessarily represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

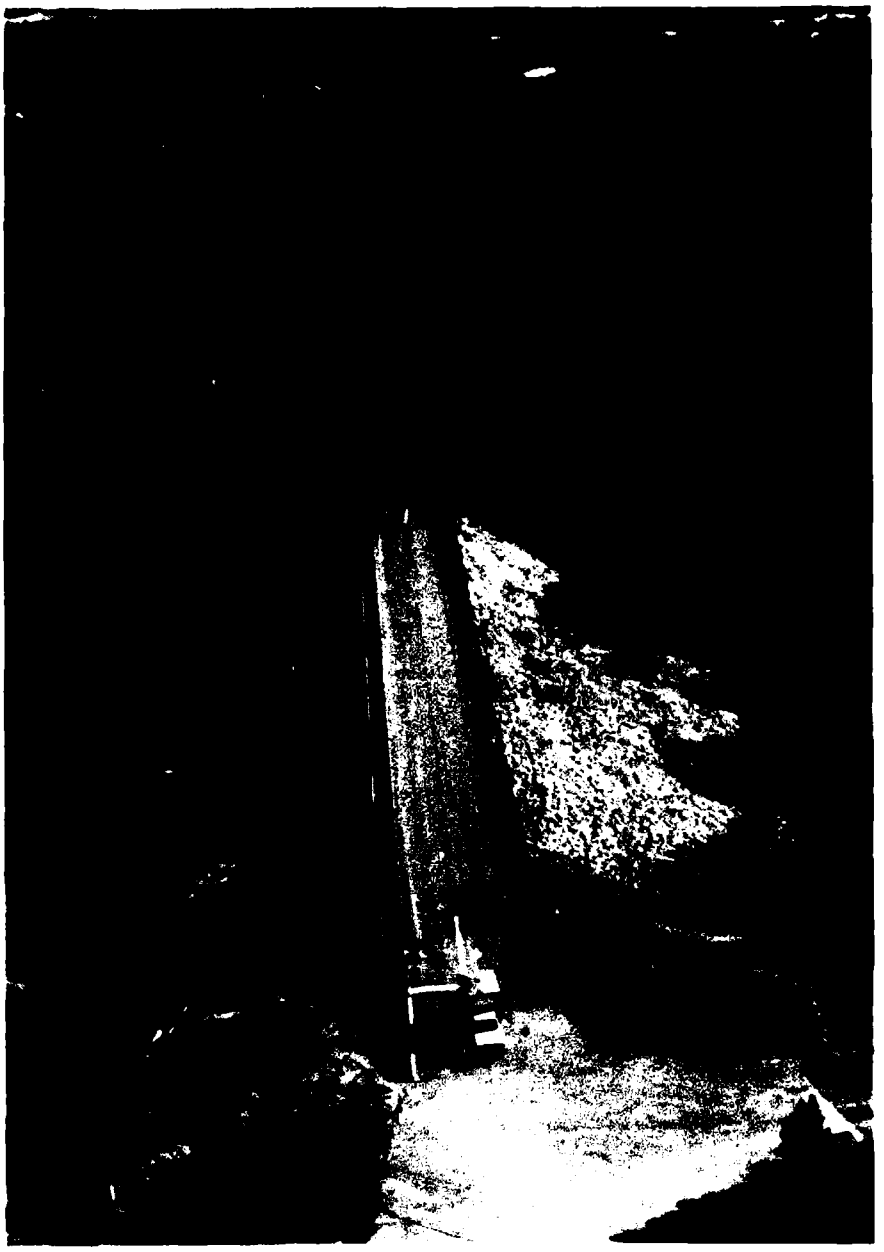
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions there of. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

SECTION 7: ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

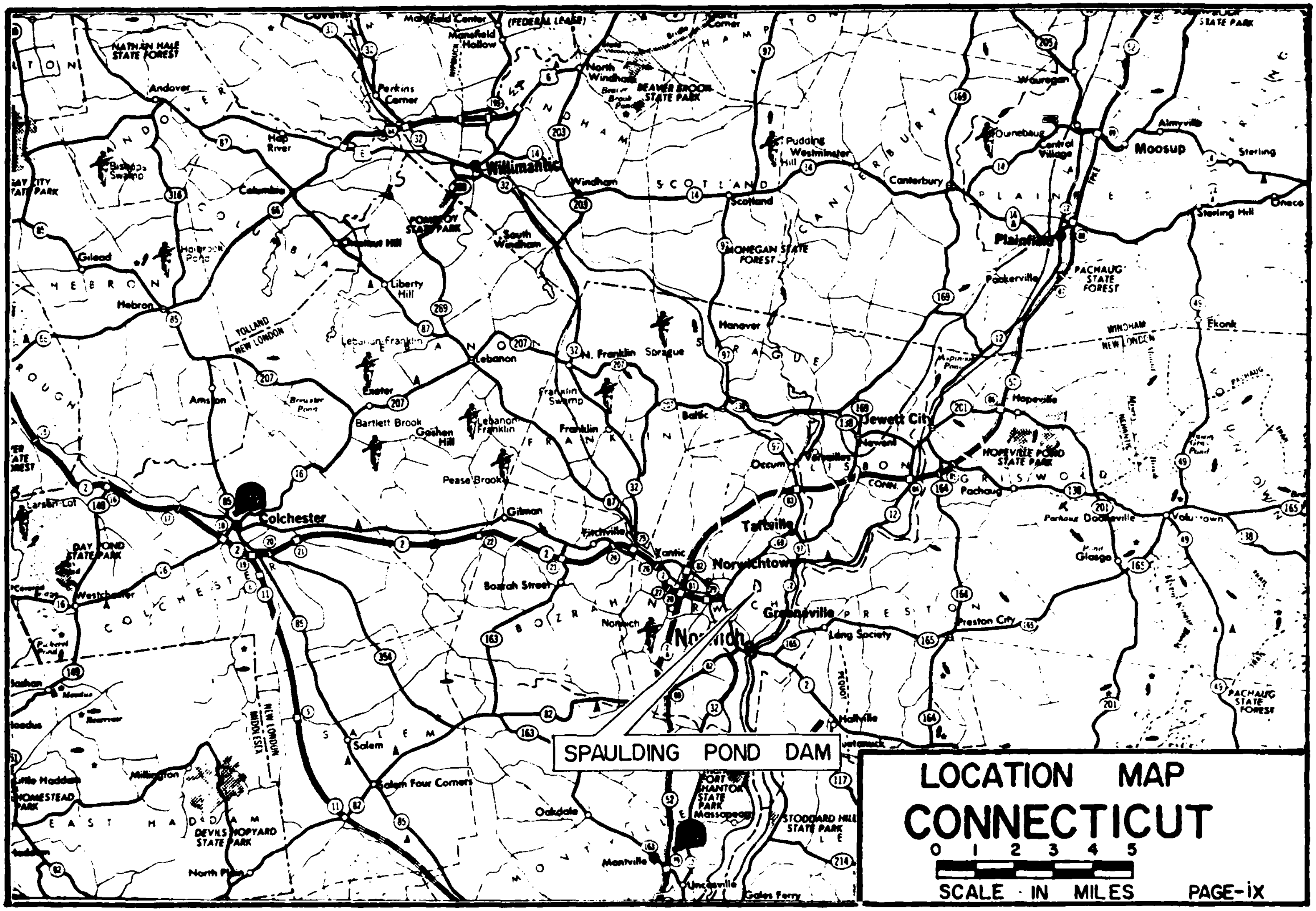
APPENDICES



OVERVIEW PHOTO

February, 1980

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	Spaulding Pond Dam Spaulding Pond Brook Norwich, Conn. CE# 27 785 KB DATE July, '80 PAGE viii


LOCATION MAP
CONNECTICUT
0 1 2 3 4 5
SCALE IN MILES
SPAULDING POND DAM
Willimantic
Colchester
Norwich
Norwichtown
Jewett City
Plainfield
Moosup
Taftville
Greeneville
Lebanon
Hebron
Andover
Columbia
Scotland
Canterbury
Windham
Franklin
Sprague
Baltic
Yantic
Occum
Versailles
Preston City
Voluntown
Glasgo
Salem
Salem Four Corners
Montville
Uncasville
Oakdale
Bozrah Street
Gilman
Fitchville
Amston
Gilead
Westchester
North Windham
South Windham
Hanover
Packerville
Hopeville
Sterling
Oneco
Almyville
Wauregan
Central Village
Ekonk
Pachaug
Long Society
Hallville
Mansfield Center
Mansfield Hollow
Perkins Corner
Liberty Hill
Exeter
Bartlett Brook
Goshen Hill
Pease Brook
Franklin Swamp
NATHAN HALE STATE FOREST
BEAVER BROOK STATE PARK
HOPEVILLE POND STATE PARK
PACHAUG STATE FOREST
DAY POND STATE PARK
DEVILS HOPYARD STATE PARK
STODDARD HILL STATE PARK
FORT SHANTOK STATE PARK
TOLLAND
NEW LONDON
MIDDLESEX
WINDHAM
PAGE-IX

PHASE I INSPECTION REPORT

SPAULDING POND DAM
SPAULDING POND DIKE

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority - Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of April 14, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0052 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dam.

3. To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 DESCRIPTION OF PROJECT

a. Location - The dam is located on Spaulding Pond Brook and the dike is located at the headwaters of an unnamed tributary to the Shetucket River, both in a rural area of the City of Norwich, County of New London, State of Connecticut. The project is shown on the Norwich USGS Quadrangle Map, having coordinates latitude N41° 32.8' and longitude W72° 04.2'.

b. Description of Project and Appurtenances - As shown on Sheet B-2, the dam is an earth embankment approximately 435 feet long and 30.5 feet high with a top width of approximately 33 feet. The upstream and downstream slopes are inclined at 3 horizontal to 1 vertical, however, the upper 10 feet of the slopes are inclined more steeply at approximately 2 horizontal to 1 vertical. The upstream slope is protected by dumped riprap to elevation 248± and grassed above the riprap to the top of the dam. The top of the dam is paved and slopes up from elevation 250.5 at its ends to elevation 253.5 at its center. There is a chain link fence along the upstream edge of the road and a guard rail along its downstream edge. The downstream slope is grass covered and contains a toe drain.

The principal spillway is a concrete drop inlet type structure located on the upstream slope at the center of the dam. The spillway crest is at elevation 244.8 and there is an orifice with invert at the normal pool elevation of 241.0. The spillway structure is protected by a galvanized steel high stage trash rack. At the bottom of the inlet shaft, at elevation 223.0 is a 30 inch diameter reinforced concrete pipe to a concrete impact basin at the downstream toe of the dam. The low level outlet is located in the principal spillway structure and consists of an 18 inch reinforced concrete pipe with inlet at the toe of the upstream slope. The low-level outlet is controlled by a sluice gate in the concrete spillway structure.

The emergency spillway is located at the right end of the dam and consists of a grassed approach channel, a paved crest at elevation 246.0, and a berm between the spillway and the downstream slope of the dam to direct flows away from the toe of the dam.

The dike is approximately 740 feet long and 18.5 feet high with a top width of 33 feet and 2½ to 1 slopes upstream and downstream. The upstream slope has riprap from elevation 240.0 to 243.0 and grass cover from the top of the riprap to about 2 feet below the top of the dike. Between the grass and the roadway on the top of the dike (el. 250.5) is a strip of loose sand and gravel and a chain link fence. The downstream slope is grass covered and contains a toe drain which outlets at a masonry headwall approximately 180 feet from the left end of the dike.

c. Size Classification - (SMALL) - The project has a maximum impoundment of approximately 290 acre-feet. The dam and dike are 30.5 and 18.5 feet in height, respectively. According to Army Corps of Engineers' recommended guidelines, the dam is classified as small in size on the basis of its height and maximum storage, and the dike is classified as small in size solely on the basis of its maximum storage.

d. Hazard Classification - (HIGH) - If the dam were breached, there is potential for loss of more than a few lives and property damage at an apartment complex approximately 3000 feet from the dam and further downstream in a fully developed area of the City of Norwich.

If the dike were breached, there is potential for loss of more than a few lives and property damage at apartments on Boswell Street and Sandy Lane and at homes at the end of Curtis Road.

e. Ownership - City of Norwich
City Manager
City Hall Union Square Norwich, CT
(203) 887-6722

f. Operator - Mr. Monroe Cilley
Director, Parks Department
Mohegan Park Norwich, CT
(203) 887-1891 - (work)
(203) 882-8545 - (home)

g. Purpose of Project - Recreational and flood control. The pond is located in a City park with bathing and picnic facilities around it. The project also controls the headwaters of Spaulding Pond Brook and reduces peak flows downstream.

h. Design and Construction History - The project was designed in 1964 by the Soil Conservation Service and constructed in 1965. The project was built to replace an earlier dam, which failed in 1963, and dike.

i. Normal Operating Procedures - Normally, the pond is left at the level of the orifice invert, except when the gates are serviced or the pond is drawn down to perform maintenance on the shoreline.

1.3 PERTINENT DATA

a. Drainage Area - The drainage area is 0.26 square miles of rolling to mountainous wooded terrain.

b. Discharge at Damsite - Discharge is through the low-level outlet, through the orifice, over the main spillway, and over the emergency spillway. There are no outlets at the dike.

1. Outlet Works (Conduits)

18 inch low-level outlet with intake invert el. 223.7:	12 cfs (pond level to test flood el. 247.5)
2. Maximum known flood at damsite:	Previous dam at site, with top elevation of 246.5, nearly overtopped before failure on March 6, 1963.
3. Orifice - 18 inches long by 12 inches high at invert el. 241.0:	17 cfs (pond level to test flood el. 247.5)
4. Ungated spillway capacity @ top of dam el. 250.5:	1142 cfs
5. Ungated spillway capacity @ test flood el. 247.5:	490 cfs
6. Gated spillway capacity @ normal pool el. 240.1:	N/A
7. Gated spillway capacity @ test flood el. 247.5:	N/A
8. Total spillway capacity @ test flood el. 247.5:	490 cfs
9. Total project discharge at top of dam el. 250.5	N/A
10. Total project discharge @ test flood el. 247.5:	490 cfs

c. Elevations - Elevations are on National Geodetic Vertical Datum, as shown on existing drawings.

1. Streambed at toe of dam:	220.0±
Toe of dike:	232.0±
2. Bottom of cutoff:	214.0± (dam)
	229.0± (dike)
3. Maximum tailwater:	N/A
4. Normal pool:	241.0±
5. Full flood control pool:	246.0

6. Spillway crest (principal):	244.8
Spillway crest (emergency):	246.0
7. Design surcharge (original design):	247.75
8. Top of dam:	250.5
9. Test flood surcharge:	247.5

d. Reservoir Length

1. Normal pool:	1,250± ft.
2. Flood control pool:	1,400± ft.
3. Spillway crest pool	
Principal Spillway:	1,350± ft.
Emergency Spillway:	1,400± ft.
4. Top of project pool:	1,500± ft.
5. Test flood pool:	1,450± ft.

e. Reservoir Storage

1. Normal pool:	140± acre-ft.
2. Flood control pool:	210± acre-ft.
3. Spillway crest pool	
Principal Spillway:	195± acre-ft.
Emergency Spillway:	210± acre-ft.
4. Top of project pool:	290± acre-ft.
5. Test flood pool:	235± acre-ft.

f. Reservoir Surface

1. Normal pool:	13± acres
2. Flood control pool:	16± acres
3. Spillway crest pool	
Principal Spillway:	15± acres
Emergency Spillway:	16± acres
4. Top of project pool:	18± acres
5. Test flood pool:	17± acres

g. Dam and Dike

1. Type:	Earth embankments

2. Length

Dam:	435 ft.
Dike:	740 ft.

3. Height

Dam:	30.5 ft.
Dike:	18.5 ft.

4. Top width

Dam and Dike:	33 ft.

5. Side slopes

Dam:	3 horizontal to 1 vertical Uppermost 10 ft. - 2H to 1V (upstream and downstream)
Dike:	2½ horizontal to 1 vertical (upstream and downstream)

6. Zoning:	Impervious soils - core Pervious soils - on downstream slope
7. Impervious core:	Most impervious material available from borrow areas
8. Cutoff:	10 feet into rock or limits of mechanical excavation
9. Grout curtain:	N/A
10. Other:	Toe drains

h. Diversion and Regulating Tunnel - N/A

i. Spillways

Principal Spillway

1. Type:	Concrete Drop Inlet
2. Length of weir:	13 ft. (effective length)
3. Crest elevation:	244.8
4. Gates:	N/A
5. Upstream channel:	N/A

6. Downstream channel:	30" R.C.P. to impact basin
7. General:	Orifice (18"x12") at invert el. 241.0

Emergency Spillway

1. Type:	Grassed and paved natural ground at right end of dam
2. Length of weir:	80 ft.
3. Crest elevation:	246.0
4. Gates:	N/A
5. Upstream channel:	Grassed
6. Downstream channel:	N/A
7. General:	Berm on left side to channel flow away from toe of dam

j. Regulating Outlets

Low-level outlet

1. Invert:	223.7
2. Size:	18 in. dia.
3. Description:	Reinforced concrete pipe
4. Control mechanism:	Hand wheel sluice gate lift
5. Other:	N/A

SECTION 2: ENGINEERING DATA

2.1 DESIGN DATA

The available design data consists of original drawings, boring logs, soil test results, a slope stability analysis for the dike, hydraulic computations, and structural computations by the Soil Conservaiton Service and correspondence concerning the design of the project.

The available data indicates the design features stated in Section 1.

2.2 CONSTRUCTION DATA

The available data consists of construction specifications, "as-built" drawings, and construction inspection reports.

As indicated by correspondence (Appendix B-23) and the "as-built" drawings, three changes to the design were incorporated during construction. These are:

1. The toe drain was moved 12 feet horizontally towards the center line of the embankment.

2. The most impervious material available from the borrow areas was delineated as a central impervious zone.

3. A 3 foot deep layer of selected pervious fill was placed on the downstream slope.

2.3 OPERATIONS DATA

The dam is inspected annually by the City of Norwich Parks Department and The Soil Conservation Service. The inspection reports are available from the Norwich (New London County) office of S.C.S. and the Norwich Parks Department (Appendix B-30).

2.4 EVALUATION OF DATA

a. Availability - Existing data was provided by the State of Connecticut Department of Environmental Protection, the Owner and the Soil Conservation Service. The Owner made the project available for visual inspection.

b. Adequacy - Since detailed design and construction data is available, the assessment of the project may be based on a review of this data as well as visual inspection, performance history and the hydrologic/hydraulic computations included in Appendix D.

c. Validity - For the most part the dam appears to be constructed as designed with the changes noted in Section 2.2.b. However, neither the design drawings or the "as-builts" show the roadway grade from elevation 250.5 at the ends of the dam to elevation 253.5 at the center of the dam. Also, the steepening of the upstream and downstream slopes, as described in Section 1.2.b, near the top of the dam is not shown on these drawings.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the project is good. The inspection revealed a few minor areas of concern which require maintenance. At the time of inspection, the pond level was at elevation 241.08±; i.e. approximately 1 inch over the orifice.

b. Project

Dam

Top of Dam - The top of the dam is covered by a bituminous asphalt roadway, which is in good condition and shows no signs of cracking. The sidewalk, chain link fence, and guard rail fence are all also in good condition (See overview Photo).

Upstream Slope - The upstream slope is in good condition (Photo 1). No significant displacement of riprap was observed. Grass cover on the upper portion of the slope appears good except at the very top of the slope where the grass has been mowed very short and is burned.

Downstream Slope - The downstream slope is in good condition with good grass cover (Photo 2). Trespassing on the slope has occurred in one area about half way between the right end and the center of the dam. Some of the grass in this area appears to be dead, but no soil erosion has yet occurred (Photo 3). A minor amount of seepage and erosion was observed adjacent to the left downstream corner of the outlet structure (Photo 6). Seepage appears to be clear of sediments, but does exhibit red iron staining. Three small depressions were observed at the toe approximately 30 feet to the right of the outlet structure, indicating possible minor settlement in the area of the toe drain. The largest of these is approximately 5 inches deep by 1.5 feet wide by 3 feet long and contains standing water (Photo 4).

Spillways - The principal spillway is in good condition, with no signs of any cracking, spalling or other deterioration of the concrete (Photo 1).

The approach channel and crest of the emergency spillway appear to be in good condition. However, the berm between the spillway and the downstream slope of the dam may not extend far enough downstream to prevent flows over the emergency spillway from discharging at and scouring the toe of the dam. Also, the small size riprap on this berm may not be sufficient to protect the berm from erosion due to high velocity flows.

Dike

Top of Dike - The roadway and fences on the top of the dike are all in good condition (Photo 9).

Upstream Slope - The upstream slope riprap and grass cover are in good condition (Photo 9). The strip of sand and gravel near the top of the slope may be suseptible to erosion.

Downstream Slope - The downstream slope is in good condition, with consistent slope inclination and good grass cover (Photo 10). There is a footpath along the toe of the slope created by trespassing.

c. Appurtenant Structures - The concrete impact basin is in excellent condition with no visible signs of cracking, spalling or other deterioration of the concrete (Photo 5).

The dam toe drain appears to be functioning adequately. At the time of inspection, the left side of the toe drain was flowing at a rate of 2-4 gallons per minute (gpm) while the right side was flowing at a rate of 4-6 gpm (Photo 7). All discharges appeared clear. The seepage adjacent to the left downstream corner of the outlet structure is evidently bypassing the left side toe drain and, as previously noted, some minor settlement of the right side of the toe drain is indicated by the small depressions at the toe of the slope. The top of the sill at the downstream end of the impact basin is at the elevation of the invert of the toe drain outlet pipes, causing ponding of water in the basin to this elevation. For this reason, it is difficult to monitor the discharge of the toe drain. The dike toe drain outlet is blocked by leaves and sediments (Photo 8). Therefore, flow from this drain could not be measured.

d. Reservoir Area - The area surrounding the pond is mostly wooded. As part of Mohegan Park, it is developed for recreation with beaches, picnic areas, pavillions, and parking areas adjacent to the shoreline.

e. Downstream Channel - From the outlet structure, there is an approximately 90 foot long channel to a 42 inch concrete pipe under an approximately 340 foot long parking area (Photo 5).

3.2 EVALUATION

Based upon the visual inspection, the project is assessed as being generally in good condition. The manner in which the features identified in Section 3.1 could affect the future condition and/or stability of the project is as follows:

1. Erosion of the downstream slope of the dam could occur due to trespassing on the slope.

2. Seepage which is evidently bypassing the left toe drain of the dam could increase, causing some erosion of the embankment.

3. The apparent settlement over the right side of the dam toe drain, as evidenced by three depressions, one of which contains standing water, could cause partial blockage of the drain.

4. Blockage of the dike toe drain outlet could cause siltation of the drain.

5. The rock material specified for the toe drains (See Sheet B-4) may be susceptible to clogging.

6. The construction of the emergency spillway may be inadequate to prevent scouring at the toe of the embankment and/or erosion of the berm between the spillway and the downstream slope, should flows over the emergency spillway occur.

SECTION 4: OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

a. General - The pond level is maintained at or about the invert elevation of the orifice. The pond level is lowered if any work has to be done to the beach areas. During the non-swimming season, if a major storm is predicted, the operator may lower the pond level in advance of the storm then close the gate when the storm begins in order to mitigate flooding downstream. Pond level readings are not taken.

b. Description of Any Formal Warning System In Effect -No formal downstream warning system is in effect.

4.2 MAINTENANCE PROCEDURES

a. General - Regular maintenance procedures at the project consist of mowing the grass on the upper portion of the upstream slopes, clearing any floating debris from near the spillway structure, and picking up litter. To discourage trespassing, the grass on the downstream slopes is not mowed, but any brush or saplings which take root are cut down. Maintenance to the roadway, guard rail and chain link fence on the crest of the dam and dike is performed on an as-needed basis. The dam is inspected annually by a representative of the Soil Conservation Service, but this is not considered to be highly technical in nature (Appendix B-30 - B-32).

b. Operating Facilities - The low-level outlet sluice gate is serviced annually by its manufacturer and exercised several times per year by the operator.

4.3 EVALUATION

The operation and maintenance procedures are generally good; however, they should be fully documented to provide complete records for future reference. Also, a formal warning system should be developed and implemented within the time-frame indicated in Section 7.1.c. Remedial operation and maintenance recommendations are presented in Section 7.3.

SECTION 5: EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The watershed is 0.26 square miles of rolling to mountainous wooded terrain. The dam impoundment is presently used for flood control and recreational purposes.

Spaulding Pond is formed by an earth dike and an earth dam, which includes a principal conduit spillway and a depressed, paved roadway section which serves as an emergency spillway. The dam is basically a high surcharge storage - low spillage type project. The available storage reduces the outflow from a Probable Maximum Flood (PMF) of 780 cubic feet per second (cfs) to 490 cfs and the ½ PMF outflow from 390 cfs to 140 cfs.

5.2 DESIGN DATA

The original design computations and construction plans, prepared by the U.S. Dept. of Agriculture Soil Conservation Service in 1964, are available for this project.

5.3 EXPERIENCE DATA

Since the dam's construction in 1965, flow over the principal spillway has not occurred. The maximum pond level, as recorded on the spillway structure by the operator occurred on January 26, 1978, when the pond surface reached approximately to elevation 243, i.e. 2 feet above the crest of the orifice.

The previous dam on the site failed on March 6, 1963 after a rainfall of 1.75 inches in the previous 24 hours.

5.4 VISUAL OBSERVATIONS

It was noted that while the design length of the principal spillway is 15 feet, its effective length is only 13 feet due to the concrete trash rack support (Photo 1).

5.5 TEST FLOOD ANALYSIS

Based upon the U.S. Army Corps of Engineers "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March, 1978, the watershed classification (Rolling to Mountainuous) and the watershed area of 0.26 square miles, a PMF of 780 cfs or 3000 cfs per square mile is estimated at the damsite. In accordance with the size (small) and hazard (high) classification, the range of test floods to be considered is from the ½ PMF to the PMF. Due to the degree of hazard associated with a breach of either the dam or dike, the test flood for the project is equivalent to the PMF. With the pre-test flood pool at the orifice invert, the peak outflow for the test flood is estimated at 490 cfs and this flow will be accomodated by the principal and emergency spillways with 3 feet of freeboard to the top of the dam. The total spillway capacity to the top of the project is 1142 cfs, which is equivalent to 230% of the routed test flood outflow.

5.6 DAM AND DIKE FAILURE ANALYSES

The dam failure analysis is based on the April, 1978 Army Corps of Engineers "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs".

Dam

Peak outflow before failure of the dam would be about 140 cfs and the peak failure outflow from the dam breaching would total about 20,000 cfs. A breach of the dam would result in a rise in the water level of the stream at the initial impact area, from a depth of 2.4 feet just before the breach to a depth of about 13.7 feet shortly after the breach. This rapid, 11.3 foot increase in water level would first inundate an apartment building by some 10 feet and then would inundate a highly developed portion of Norwich, causing the loss of more than a few lives and severe economic loss (Appendix D-5,6,7).

Dike

Peak failure outflow from breaching of the dike would be about 9,300 cfs. This flow would split into two separate courses (one to the south and one to the southeast) each generating an increase in flow depth of about 4.0 feet, which corresponds to an increase from a negligible depth before failure to a depth of 4.0 feet after failure of the dam. This rapid 4.0 foot increase in water level could cause several apartment buildings to the southeast and at least 4 houses to the south of the dike to be innundated with approximately 3 feet of water (Appendix D-5, 7,8,9).

Based upon the dam failure analyses, both Spaulding Pond Dam and Spaulding Pond Dike are classified as having a high hazard potential.

SECTION 6: EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The visual inspection did not reveal any indications of stability problems. As discussed in Section 2.4.c., the grade of the roadway across the top of the dam and the upper slopes of the dam were not constructed per design; however this does not appear to affect the stability of the structure.

6.2 DESIGN AND CONSTRUCTION DATA

The project was constructed in accordance with S.C.S. design. Some of this design information is available.

6.3 POST-CONSTRUCTION CHANGES

There are no known post-construction changes to the project.

6.4 SEISMIC STABILITY

The project is in Seismic Zone 1 and according to the Recommended Guidelines, need not be evaluated for seismic stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 PROJECT ASSESSMENT

a. Condition - Based upon the visual inspection of the project and past performance, the project appears to be in good condition, with areas which require maintenance or monitoring. No evidence of structural instability was observed in the dam, dike, spillways, or appurtenant structures.

Based upon "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March 1978, the watershed area and classification, and hydraulic/hydrologic computations, the peak inflow to the pond at test flood is 780 cfs; peak outflow is 490 cfs, with the project maintaining 3 feet of freeboard. Based upon our hydraulics computations, the combined spillway capacity to the top of the dam is 1142 cfs, which is equivalent to approximately 230% of the routed test flood outflow.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the project must be based solely on visual inspection, past performance, review of existing engineering data, and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be initiated within two years of the owner's receipt of this report.

7.2 RECOMMENDATIONS

It is recommended that further studies be made by a registered professional engineer qualified in dam design and inspection pertaining to the following items. Recommendations made by the engineer should be implemented by the owner.

1. An analysis of the condition and functioning of the dam and dike toe drains.

2. A detailed hydraulic analysis of the emergency spillway to determine the potential for scouring at the toe of the dam or erosion of the berm caused by possible flows over the emergency spillway.

3. Investigation of the cause of the depressions at the toe of the dam embankment and determination of the source of the standing water in one of the depressions. The depressions should be filled with selected soils and seeded. This area should be checked periodically for the presence of any further depressions.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken by the owner within the length of time indicated in Section 7.1.c and continued on a regular basis.

1. Round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharge. A formal downstream warning system should be developed, to be used in case of emergencies at the dam.

2. The operation and maintenance procedures should be fully documented to provide accurate records for future reference.

3. The annual inspection program should be continued and expanded to include technical inspection by a registered professional engineer.

4. The seepage adjacent to the outlet structure should be monitored periodically to detect any possible changes in flow rate or sediment content and the eroded area should be filled, regraded and seeded.

5. Measures should be taken to prevent trespassing on the downstream slope of the dam. If found to be necessary, areas where trespassing has occurred should be reseeded to prevent soil erosion.

6. The dike toe drain outlet should be cleared and kept clear to allow for a free flow from this drain.

7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Spaulding Pond Dam

DATE: June 2, 1980

TIME: 8am

WEATHER: Overcast 65°

W.S. ELEV. ____ U.S. ____ DN.S

PARTY:	INITIALS:	DISCIPLINE:
1. Peter Heynen	PH	Geotechnical
2. Ted Stevens	TS	Geotechnical
3. Hector Moreno	HM	Hydraulics
4. Robert Jahn	RJ	Hydraulics
5. Monroe Cilley	MC	Norwich Parks Dept.
6. Steve Gorstka	SG	Norwich Eng. Dept.

PROJECT FEATURE	INSPECTED BY	REMARKS
1. Dam Embankment		
2. Dike Embankment		
3. Intake Structure		
4. Outlet Structure		
5. Emergency Spillway		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

PERIODIC INSPECTION CHECK LIST

PROJECT Spaulding Pond Dam DATE 6-2-80

PROJECT FEATURE Dam Embankment BY All

AREA EVALUATED		CONDITION
DAM EMBANKMENT		
Crest Elevation		250.5
Current Pool Elevation		241.08
Maximum Impoundment to Date		243±
Surface Cracks		None observed
Pavement Condition		Good - roadway
Movement or Settlement of Crest		None observed
Lateral Movement		
Vertical Alignment		Appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		Erosion at outlet headwall
Indications of Movement of Structural Items on Slopes		None observed
Trespassing on Slopes		yes - downstream slope
Sloughing or Erosion of Slopes or Abutments		None observed
Rock Slope Protection-Riprap Failures		None observed
Unusual Movement or Cracking at or Near Toes		Minor settlement over toe drains
Unusual Embankment or Downstream Seepage		Minor amt bypassing toe drains
Piping or Boils		No
Foundation Drainage Features		N/A
Toe Drains		Good Condition - Est. flowing at 2-4 gpm
Instrumentation System		N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Spaldy Pond Dam DATE 6-2-80

PROJECT FEATURE Dike Embankment BY All

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	250.5
Current Pool Elevation	241.08
Maximum Impoundment to Date	243 ±
Surface Cracks	None observed
Pavement Condition	Good - roadway
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	Appears good
Horizontal Alignment	Appears good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None observed
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection-Riprap Failures	None observed
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	
Toe Drains	
Instrumentation System	N/A
Trespassing on Slopes	Path at toe

PERIODIC INSPECTION CHECK LIST

PROJECT Spaulding Pond Dam DATE 6-2-80

PROJECT FEATURE Intake Structure BY All

AREA EVALUATED		CONDITION
OUTLET WORKS-INTAKE CHANNEL AND INTAKE STRUCTURE		
a) Approach Channel		Approach channel too deep to observe
Slope Conditions		
Bottom Conditions		
Rock Slides or Falls		
Log Boom		
Debris		
Condition of Concrete Lining		
Drains or Weep Holes		
b) Intake Structure		
Condition of Concrete		good
Stop Logs and Slots		Low-level outlet in closed position. Gate valve in good condition.

PERIODIC INSPECTION CHECK LIST

PROJECT Spaulding Pond Dam DATE 6-2-80

PROJECT FEATURE Outlet Structure BY All

AREA EVALUATED		CONDITION
OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL		
General Condition of Concrete		Good
Rust or Staining		None observed
Spalling		
Erosion or Cavitation		
Visible Reinforcing		
Any Seepage or Efflorescence		
Condition at Joints		Good
Drain Holes		12" outlets from toe drains
Channel		D/S channel silty, grassed to 42" RCP under parking lot
Loose Rock or Trees Overhanging Channel		None observed
Condition of Discharge Channel		Fair

PERIODIC INSPECTION CHECK LIST

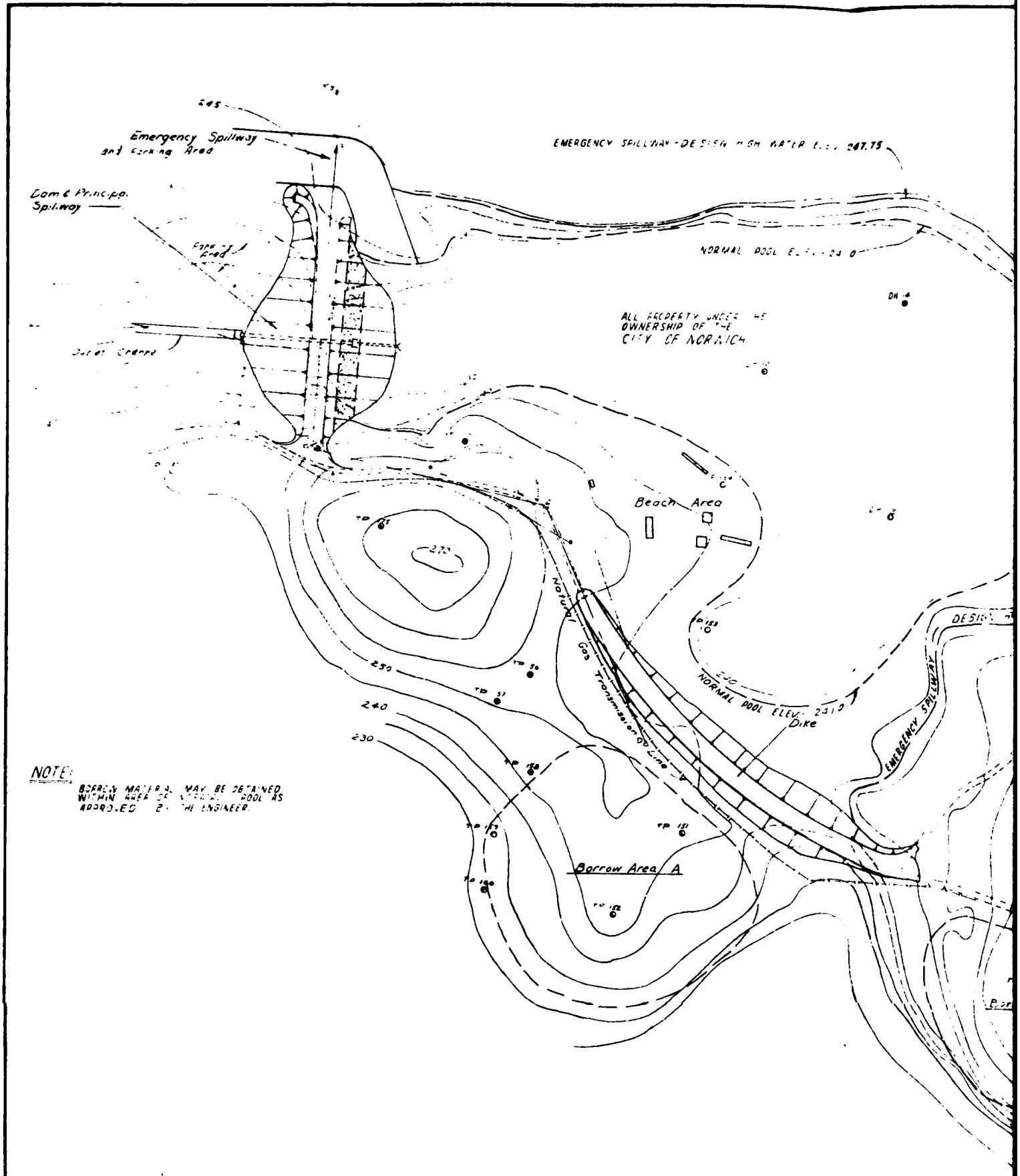
PROJECT Spaulding Pond Dam DATE 6-2-80

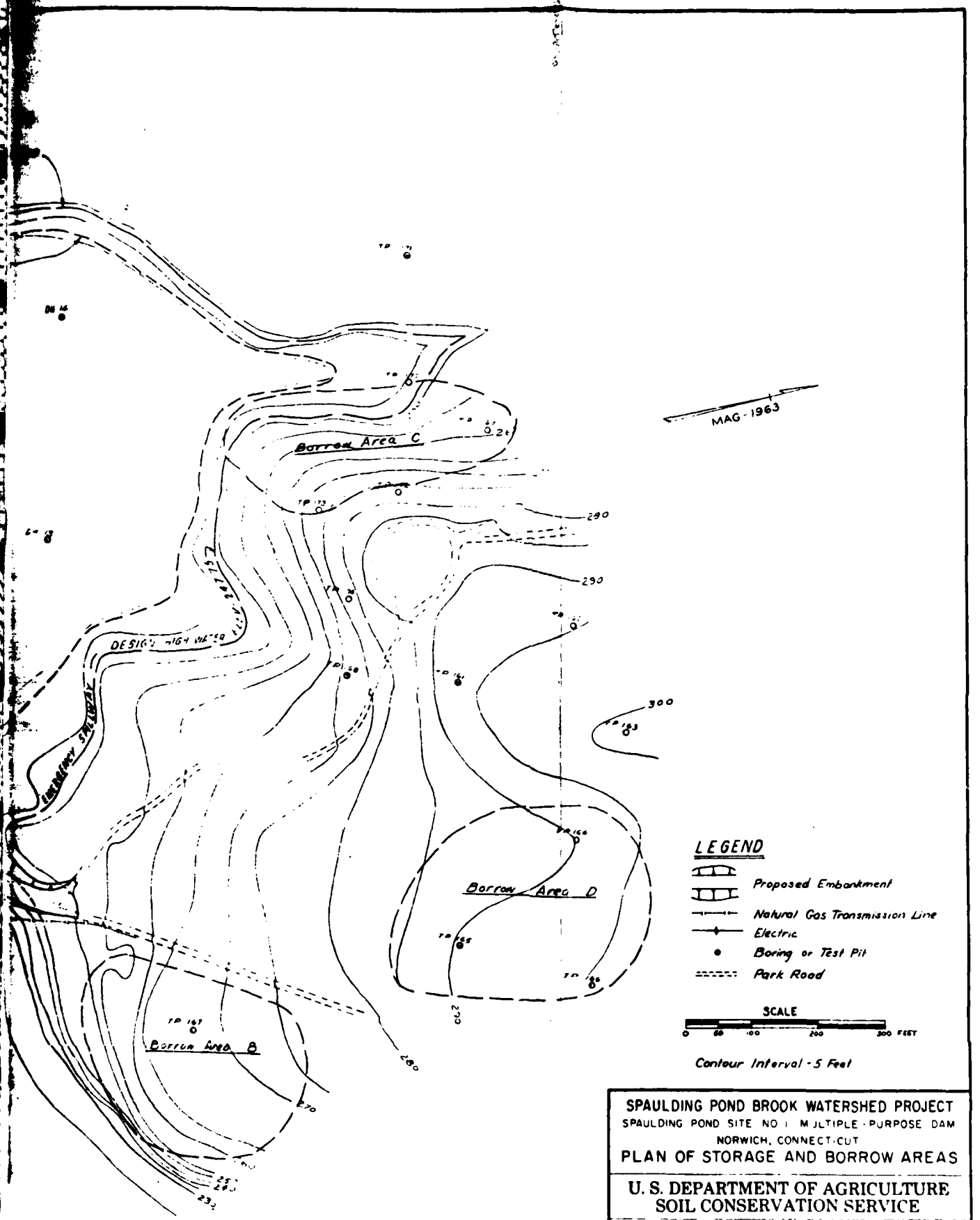
PROJECT FEATURE Emergency Spillway BY All

AREA EVALUATED		CONDITION
OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a) Approach Channel		
General Condition		Grassed bank of pond
Loose Rock Overhanging Channel		No
Trees Overhanging Channel		No
Floor of Approach Channel		Grass-good cover
b) Weir and Training Walls		None - spillage would be over paved area at right end of dam. Downstream slope of dam protected by berm which directs flow away from dam.
General Condition of Concrete		
Rust or Staining		
Spalling		
Any Visible Reinforcing		
Any Seepage of Efflorescence		
Drain Holes		
c) Discharge Channel		
General Condition		
Loose Rock Overhanging Channel		No
Trees Overhanging Channel		Stand of trees in channel
Floor of Channel		Grassed
Other Obstructions		Picnic tables farther down may be in path of spillway flow.

APPENDIX B

ENGINEERING DATA AND CORRESPONDENCE


Emergency Spillway and Parking Area
Low Profile Spillway
Type of Fence
Outlet Conduit
EMERGENCY SPILLWAY - DESIGN HIGH WATER ELEV. 247.75
NORMAL POOL ELEV. 234.0
ALL PROPERTY UNDER THE OWNERSHIP OF THE CITY OF NORWICH
Beach Area
Natural Gas Transmission Line
NORMAL POOL ELEV. 231.0
Dike
EMERGENCY SPILLWAY
Borrow Area A
NOTE:
BORROW MATERIAL MAY BE OBTAINED WITHIN AREA OF NORMAL POOL AS APPROVED BY THE ENGINEER.



SPAULDING POND BROOK WATERSHED PROJECT
SPAULDING POND SITE NO. 1 MULTIPLE-PURPOSE DAM
NORWICH, CONNECTICUT
PLAN OF STORAGE AND BORROW AREAS

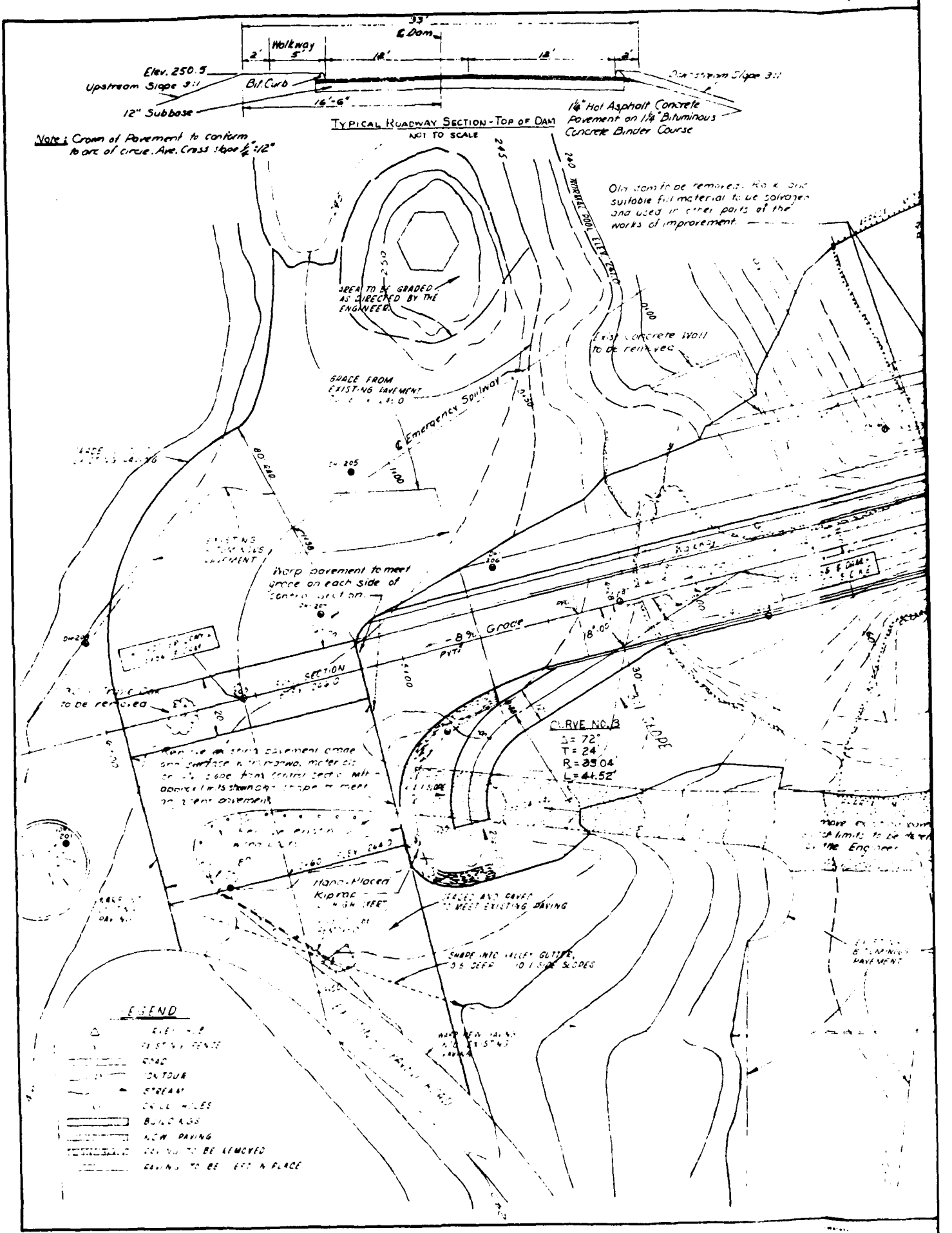
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

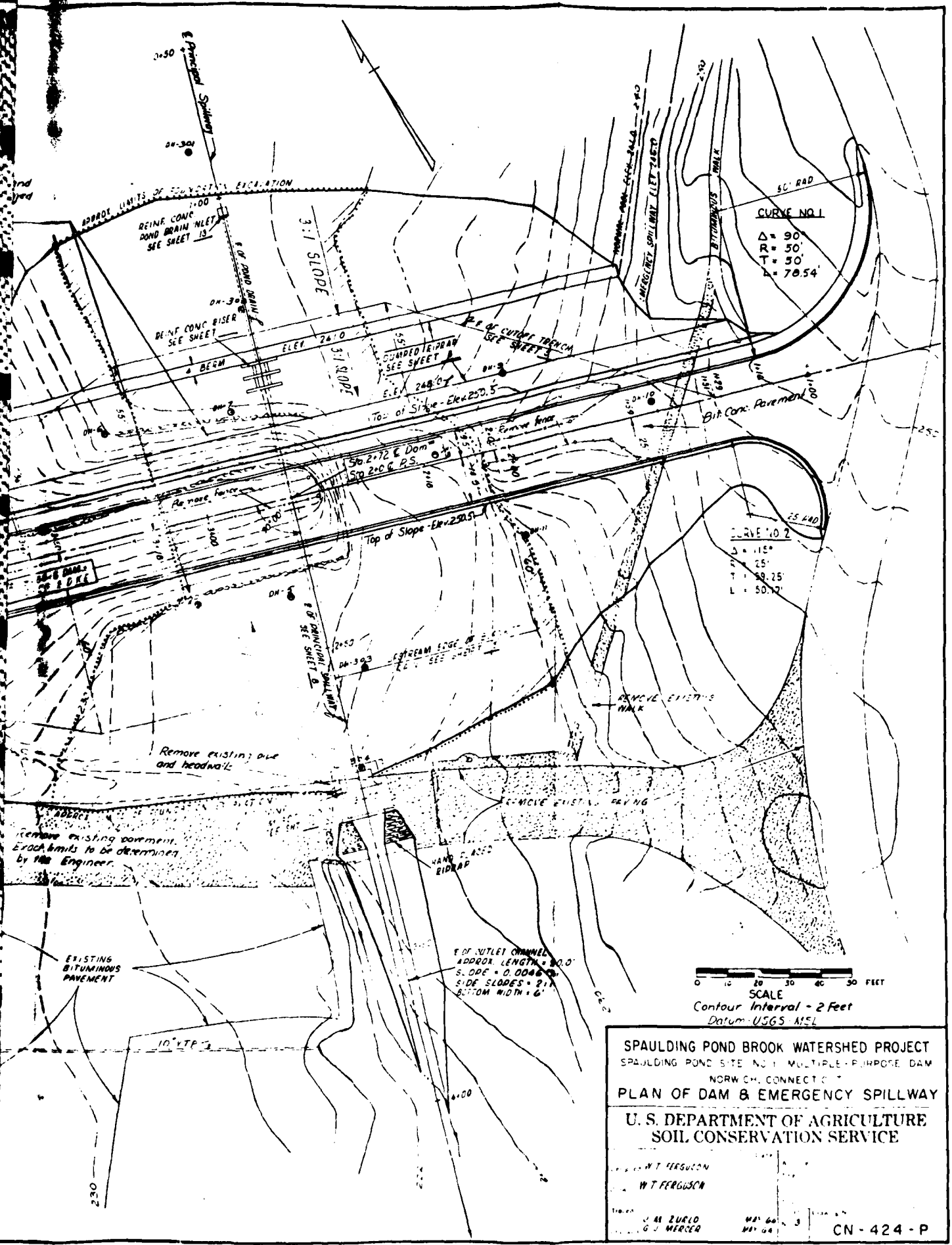
Designed A. T. FERGUSON
Drawn A. T. FERGUSON
Traced
Checked F. H. WYSONG MAY 64

CN - 424 - P

Sheet B-1

2


33'
℄ Dam
Walkway
2'
5'
18'
18'
2'
Elev. 250.5
Upstream Slope 3:1
Bit. Curb
Downstream Slope 3:1
12" Subbase
16'-6"
1½" Hot Asphalt Concrete Pavement on 1¼" Bituminous Concrete Binder Course
TYPICAL ROADWAY SECTION - TOP OF DAM
NOT TO SCALE
Note: Crown of Pavement to conform to arc of circle. Ave. Cross Slope ½":12"
Old dam to be removed. Rock & other suitable fill material to be salvaged and used in other parts of the works of improvement.
AREA TO BE GRADED AS DIRECTED BY THE ENGINEER
GRADE FROM EXISTING PAVEMENT
℄ Emergency Spillway
Exist. Concrete Wall to be removed
Warp pavement to meet grade on each side of control section.
-8% Grade
PVT
SECTION
to be removed
CURVE NO. 3
Δ = 72°
T = 24'
R = 39.04'
L = 41.52'
Hand-Placed Riprap
SEALED AND CAVED TO MEET EXISTING PAVING
SHAPE INTO VALLEY GUTTER
LEGEND
EXISTING FENCE
GRADE
CONTOUR
STREAM
BUILDINGS
NEW PAVING
EXISTING TO BE REMOVED
EXISTING TO BE LEFT IN PLACE



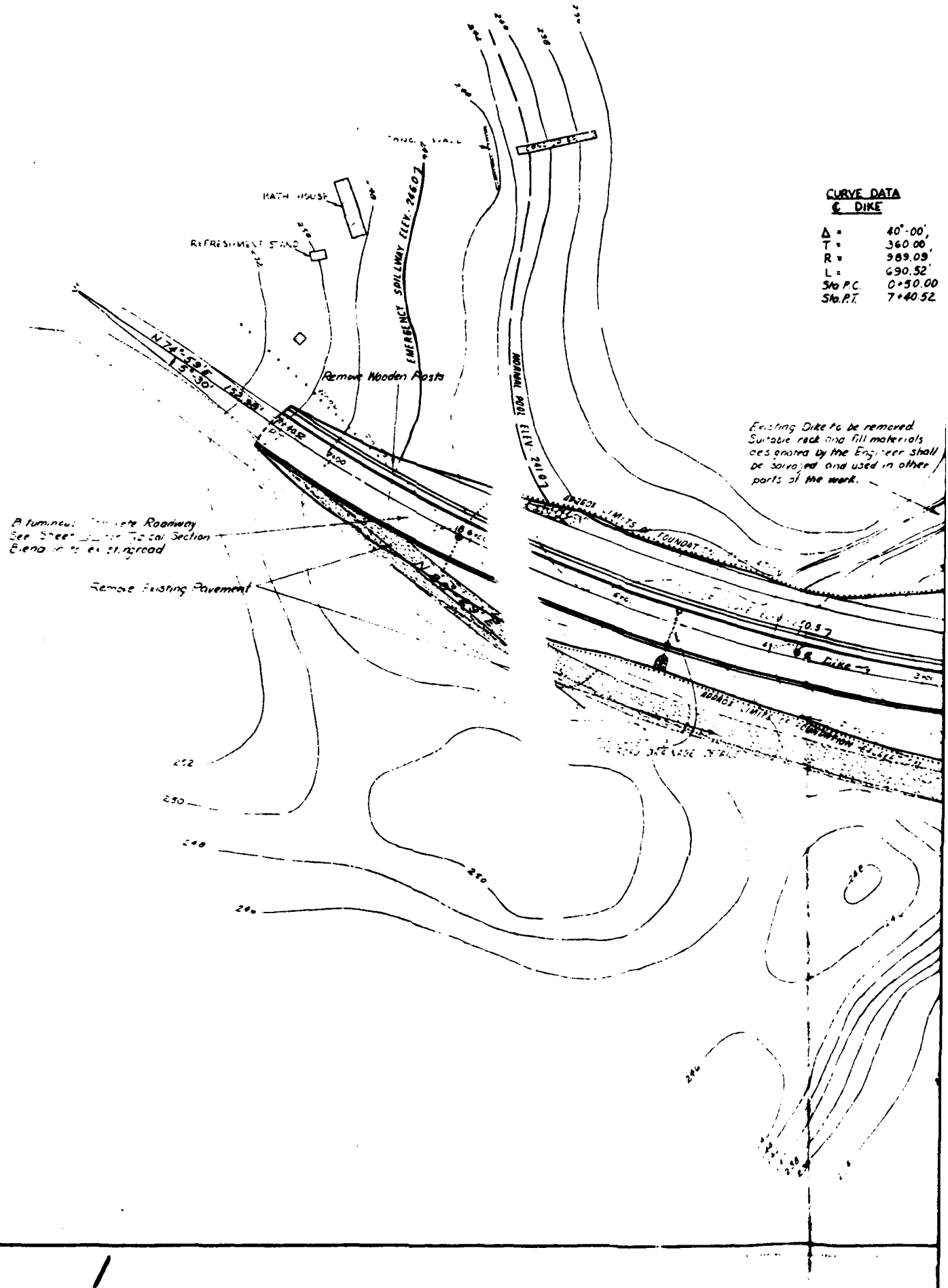
SPAULDING POND BROOK WATERSHED PROJECT
SPAULDING POND SITE NO 1 MULTIPLE-PURPOSE DAM
NORWICH, CONNECTICUT
PLAN OF DAM & EMERGENCY SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

W. T. FERGUSON
W. T. FERGUSON
J. M. ZURLO
G. J. MERCER

CN - 424 - P

Sheet B-2


CURVE DATA
℄ DIKE
Δ = 40°-00'
T = 360.00'
R = 989.09'
L = 690.52'
Sta P.C. 0+50.00
Sta P.T. 7+40.52
BATH HOUSE
REFRESHMENT STAND
EMERGENCY SPILLWAY ELEV. 246.0
NORMAL POOL ELEV. 241.0
Remove Wooden Posts
N 74°-53' E
153.38'
Existing Dike to be removed. Suitable rock and fill materials designated by the Engineer shall be salvaged and used in other parts of the work.
Bituminous Concrete Roadway
See Sheet ___ for Typical Section
Blend into existing road
Remove Existing Pavement
℄ DIKE
252
250
248
246
244

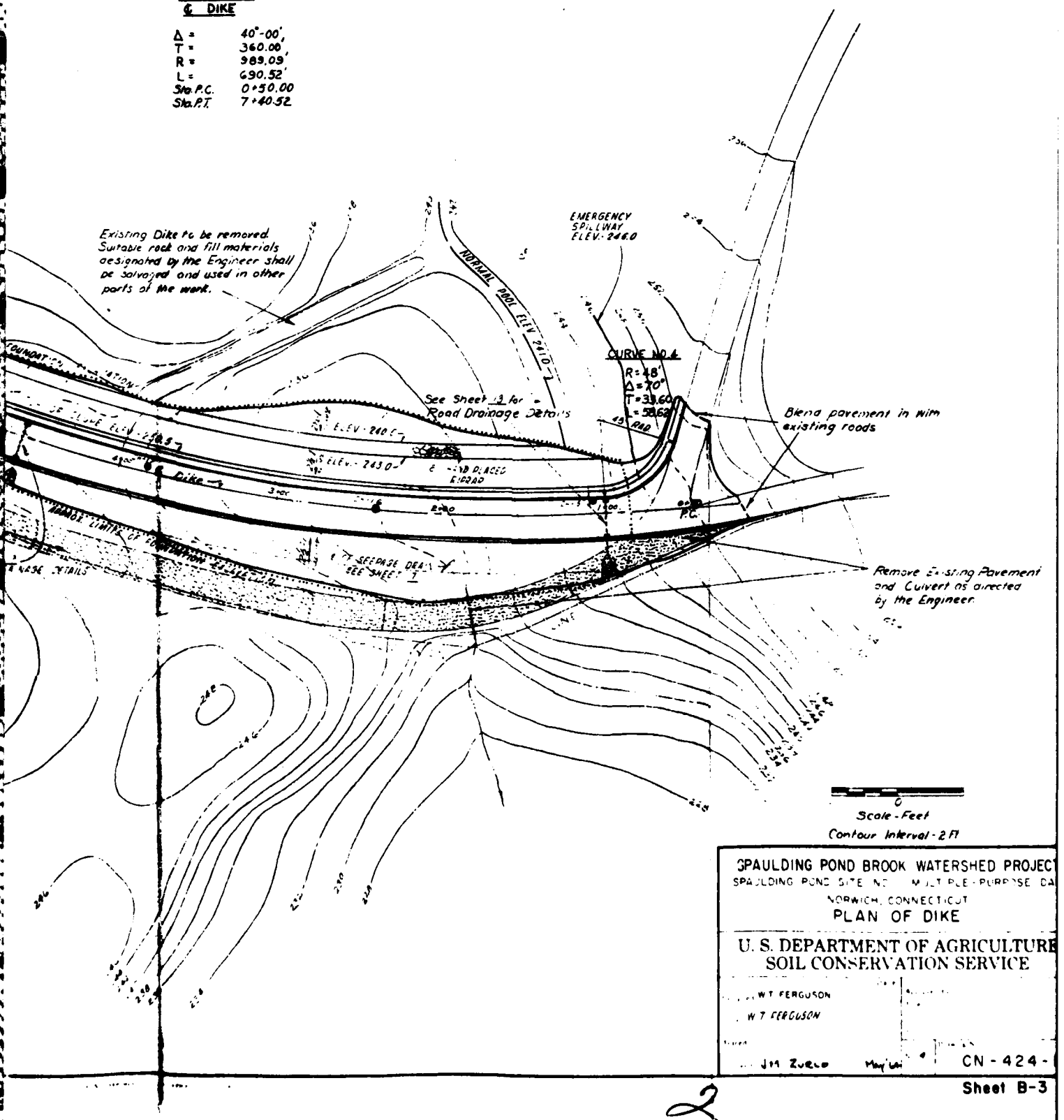
GENERAL NOTES

1. All work in the vicinity of the natural gas transmission line shall be done in accordance with regulations as prescribed by the Algonquin Gas Transmission Company. The contractor shall give the gas company sufficient notice of his intent to work to allow time for a company representative to be on the site, and shall not proceed with the work without permission from the company.

MAG. - 1983

CURVE DATA
℄ DIKE

Δ =	40°-00'
T =	360.00'
R =	989.09'
L =	690.52'
Sta. P.C.	0+50.00
Sta. P.T.	7+40.52



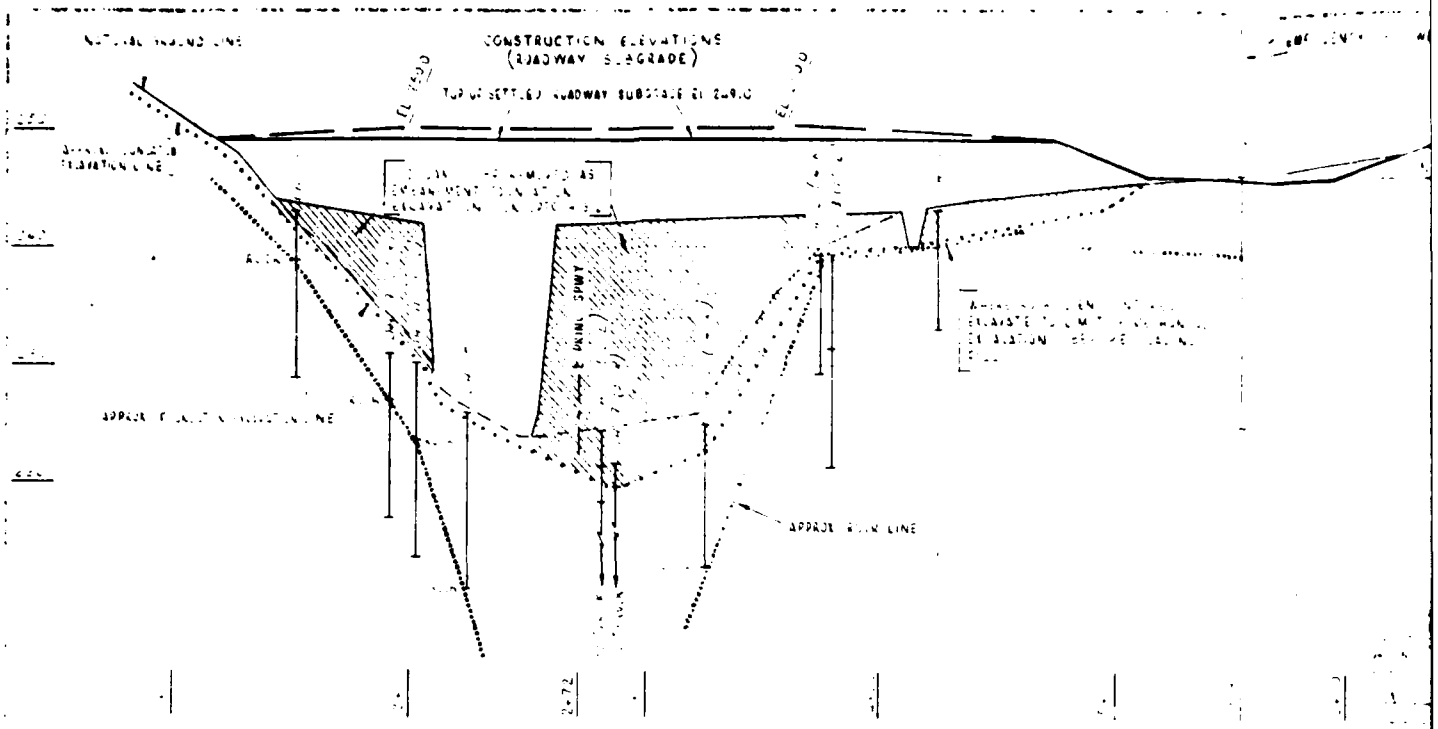
SPAULDING POND BROOK WATERSHED PROJECT
SPAULDING POND SITE NO. MULTIPLE-PURPOSE DA
NORWICH, CONNECTICUT
PLAN OF DIKE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

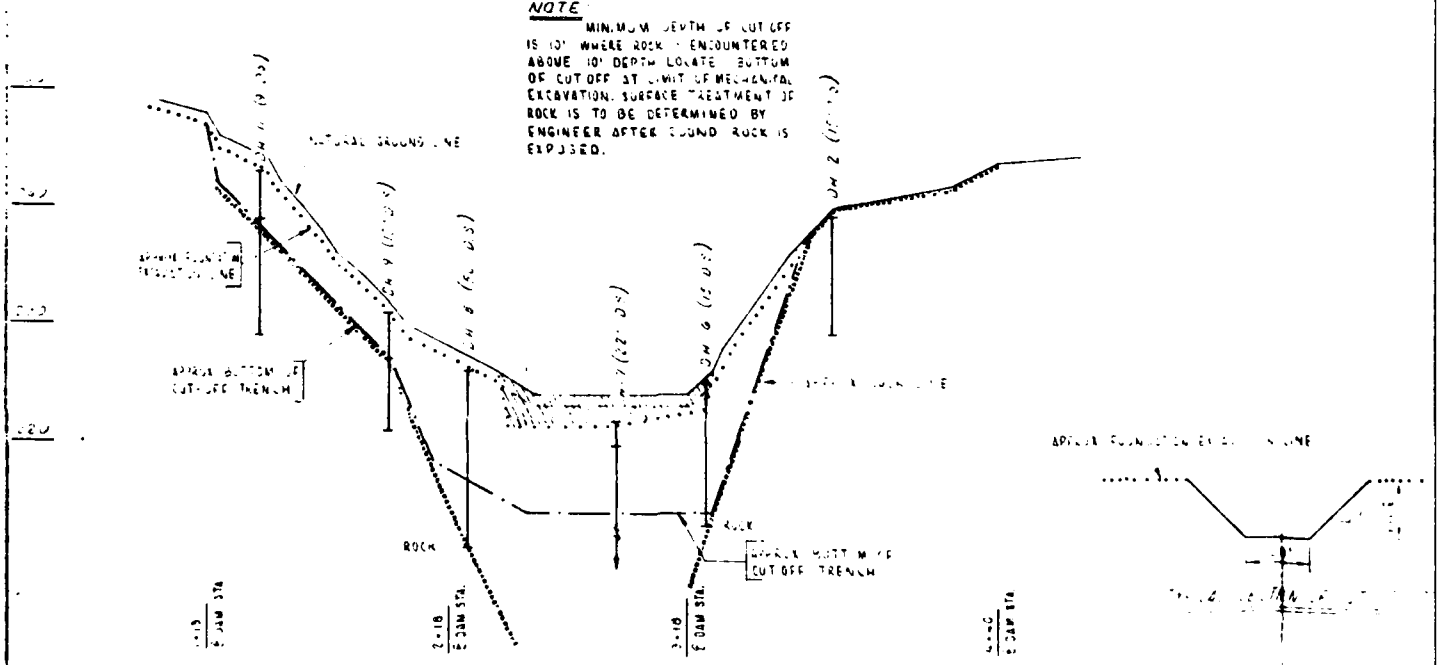
W.T. FERGUSON
W.T. FERGUSON
Jim Zuelo
CN - 424 -

Sheet B-3

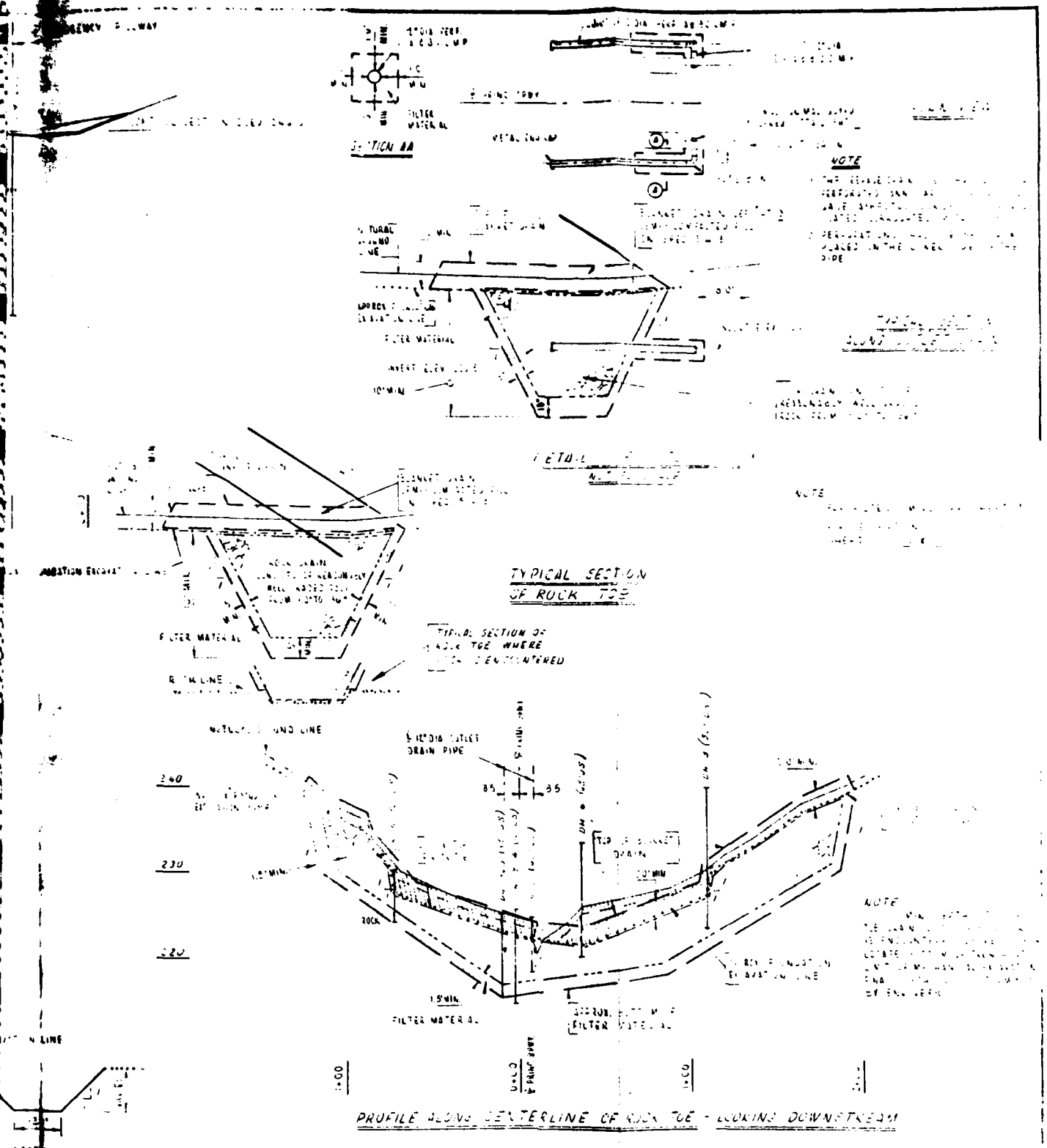
2



PROFILE ALONG CENTERLINE OF DAM - LOOKING DOWNSTREAM



PROFILE ALONG CENTERLINE OF CUT-OFF TRENCH - LOOKING DOWNSTREAM



PROFILE ALONG CENTERLINE OF ROCK TOE - LOOKING DOWNSTREAM

SECTION OF CUT

SPAULDING POND BROOK WATERSHED PROJECT

SPAULDING POND SITE NO. 1 MULTIPLE PURPOSE DAM

NORWICH, CONNECTICUT

PROFILES

G J MERCER MAY 64
J ZURLO MAY 64

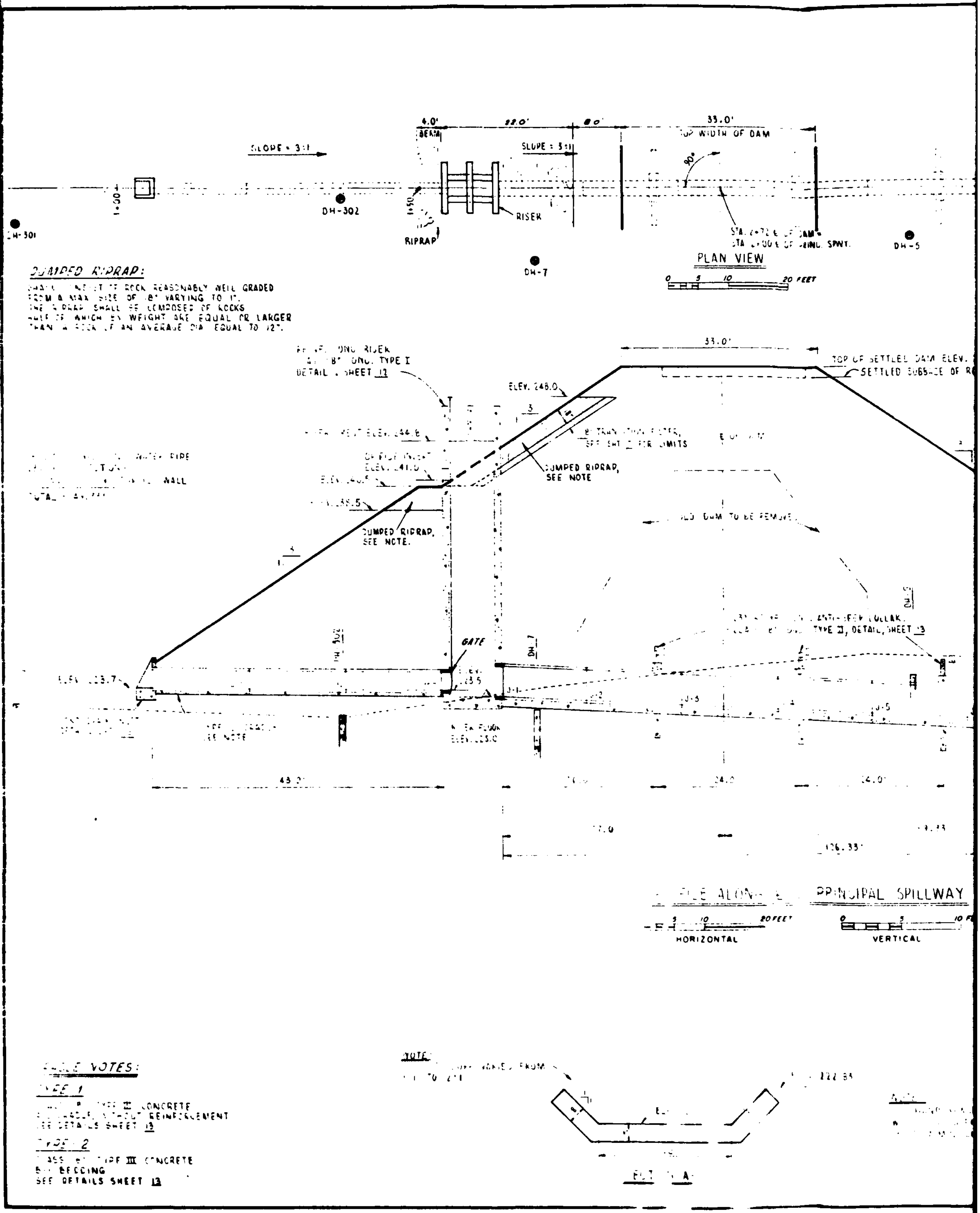
M T BROWNING JR MAY '64

J ZURLO MAY '64 5

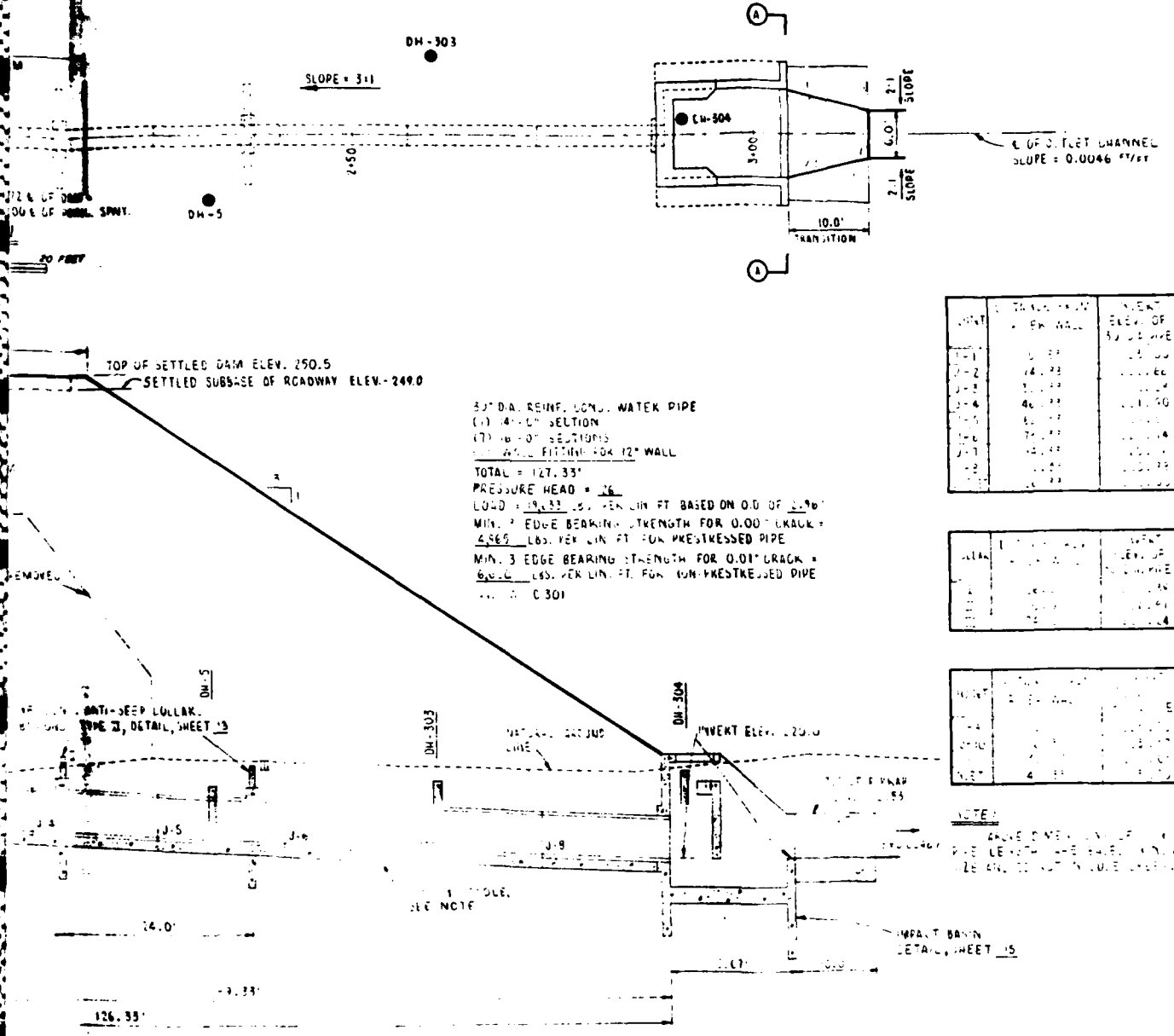
CN-424-P

Sheet B-4

2



4.0'
BERM
22.0'
8.0'
33.0'
TOP WIDTH OF DAM
SLOPE = 3:1
SLOPE = 3:1
90°
DH-301
DH-302
RISER
RIPRAP
DH-7
DH-5
PLAN VIEW
0 5 10 20 FEET
DUMPED RIPRAP:
33.0'
ELEV. 248.0
DUMPED RIPRAP, SEE NOTE
DUMPED RIPRAP, SEE NOTE.
GATE
43.0'
24.0'
24.0'
PRINCIPAL SPILLWAY
HORIZONTAL
VERTICAL
TYPE 1
TYPE 2
BEDDING
SEE DETAILS SHEET 13



℄ PRINCIPAL SPILLWAY

20 FEET 0 5 10 FEET
VERTICAL

NOTE:
FOR DESCRIPTION OF TEST HOLES
SEE SHEETS 9, 10 & 11

SPAULDING POND BROOK WATERSHED PROJECT	
SPAULDING POND SITE NO. 1 MULTIPLE-PURPOSE DAM	
NORWICH, CONNECTICUT	
PLAN-PROFILE OF PRINCIPAL SPILLWAY	
U.S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
Designed G.J. MERCER MAY 64	Approved Title
Drawn J. ZURLO MAY 64	Title
Traced W.H. MORGAN MAY 64	Title
Checked F.M. WYSONG, J.M. ZURLO MAY 64	Sheet No. 8
	Drawing No. CN-424-P

SPAULDING POND DAM
SPAULDING POND DIKE

EXISTING PLANS

Spaulding Pond Brook Watershed Project
Multiple Purpose Floodwater & Recreation Dam
Spaulding Pond Site No. 1
U.S. Department of Agriculture
Soil Conservation Service
May, 1964

Sheet 1	Cover Sheet
Sheet 2	Plan of Storage and Borrow Areas
Sheet 3	Plan of Dam & Emergency Spillway
Sheet 4	Plan of Dike
Sheet 5, 6	Profiles
Sheet 7	Seepage Drain Details of Dike
Sheet 8	Plan-Profile of Principal Spillway
Sheets 9, 10, 11	Logs of Test Holes
Sheet 12	Riser Details
Sheet 13	Cradle, Collar & Pond Drain Inlet Details
Sheet 14	Trash Racks & Miscellaneous Details
Sheet 15	Impact Basin Details

Note: Design drawings 2,3,4,5, and 8 above are included herein as Sheet B-1 through Sheet B-5. The drawings obtained by Cahn Engineers marked "As-Built" produced poor quality reproductions and therefore, were not used. Minor revisions shown on the "As-Builts" consist of slight variations in the foundation excavation line and the items mentioned on Page B-23.

SPAULDING POND DAM

SUMMARY OF DATA AND CORRESPONDENCE

SUMMARY OF DATA AND CORRESPONDENCE (Continued)

DATE	TO	FROM	SUBJECT	PAGE
July 21, 1965	William P. Sander	I.R. Skoglund	Completion of construction	B-27
Sept. 26, 1967	City of Norwich Norwich, CT	John J. Curry	Certificate of Approval	B-28
Feb. 25, 1974	File	Water Resources Commission	Inventory data	B-29
Aug. 12, 1975	Robert G. Halstead State Conservationist S.C.S.	Sherman Chase District Conservationist	Inspection Report	B-30
July 12, 1977	File	Donald McArthur S.C.S.	Inspection Report	B-31
Sept. 22, 1978	Gary Parker S.C.S.	Walter J. Wadja Director of Public Works City of Norwich	Inspection Report	B-32

SPAULDING POND DAM
FAILURE OF MOHEGAN PARK
NORWICH, CONNECTICUT

Spaulding pond had an estimated drainage area of 140 acres and a surface area, full pond, of about 12 acres. The drainage area is wooded and at the time of inspection the ground was frozen and the surface in part was covered by ice and snow.

The normal surface water elevation in the pond was 244' msl, the dam being about 20' high at the highest point. The dam was apparently of uniform earth fill construction about 200'-250' long. Top width was about 10' and side slopes estimated at 1 to 1. There was a 5' high dry masonry retaining wall at the downstream toe of the dam and the upstream surface was faced with about 1' of rock. The downstream slope was bare except for nominal forest litter and supported trees up to 6" in diameter.

It was reported to us that there was an 8" gated pipe through the base of the dam. The overflow spillway consists of a channel about 1.5' deep x 3 to 4' wide formed in the native material, which is rock at the upper end, and extends across the right abutment, down the valley slope and enters the stream about 25 feet from the downstream toe of the dam. Flow through the spillway is controlled by a low concrete weir about 2' long formed in a notch in the ledge.

The crest of the weir is about 2 to 3' below the top of the dam and at the time of our inspection there was no evidence of recent large flows in the overflow channel. However, it was evident that the pond [illegible] failure.

Failure occurred during the evening of March 6, 1963 after a rainfall of about 1.75 inches in the previous 24 hours.

The resulting flood wave swept through a small recreation pool immediately downstream from the dam and through a skating pond, approximately 3 acres in area, about ½ mile below the dam. A short distance below this pond the wave left the park and entered the urban area of Norwich at East Baltic Street. From a point about 150' south of Hickory Street to tide water in the Shetucket River, a distance of about 0.85 miles, the normal flow of the stream is carried in a closed conduit having steep slopes and variable cross-section and construction.

The flood wave bypassed the conduit at its entrance at [illegible] elevation 130 msl and followed a course through and around buildings and down streets to tide water. The upper half of this reach has an average slope of about 125-40/.42 = 200 ft/mi. The lower half of the conduit reach has an average slope of about 100 ft/mi.

Most of the property damage and all of the loss of life (8) occurred in the reach where the flood bypassed the conduit.

Hartford Courant 3-20-63

Dam Disaster

17-Minute Warning Useless

NORWICH (AP) — Norwich had just 17 minutes to try to avert disaster the night of the flood, according to a city official's report released Tuesday.

The flash flood took six lives and caused property damage in the millions of dollars.

Here is the schedule, as reported by Orrin Carashick, corporation counsel, who was acting city manager on March 6:

4:30 p.m. March 6: Public works department employes notice seepage at Spaulding Pond Dam.

Around 6 p.m.: Public Works Director Harold M. Waltz, who was in Hamden attending a meeting of public works officials, returns, is notified of the seepage, and goes to the dam. Walz notes water is seeping through about two-thirds of the way up the earth and rock barrier and there is no erosion. The spillway is open all the way. Walz, remembering that seepage has occurred in previous rainy spells, is not alarmed.

7:30 p.m.. Walz calls the Norwich Bulletin and tells the newspaper about the seepage.

8:15 p.m.: Walz goes on tour of the city to see what minor flooding has occurred as a result of the day's rain. He meets Carashick by chance and talks the situation over with him. He does not mention the seepage at Spaulding Pond Dam.

Shortly after 9 p.m.: Walz returns to the dam and finds water gushing from it. Since there is no telephone at the site, he drives to a city garage and calls police from there.

9:20 p.m.: Police receive Walz's call. Capt. James C. Casey starts calling people who live near the dam, warning them of the danger and telling them to warn their neighbors. A police cruiser is sent to the area. Its loudspeaker fails to work, and the cruiser goes up and down the streets with its siren blasting.

9:25 p.m.: Police call radio station WICH and ask it to broadcast an alert to residents of the Spaulding Pond area. There is only an engineer at the station. News Director Edward Leonard is notified at his home in Montville.

9:35 p.m.: Police receive call from Leonard wanting to know what he should say. Leonard plans to call his station and make a tape which the engineer can then put on the air.

9:37 p.m.: Leonard is still on the phone when a call comes in from Walz. The dam has broken.

UNITED STATES GOVERNMENT

Memorandum

TO : T. R. Wire, State Conservation Engineer, SCS, Storrs, Connecticut 06268

DATE: April 13, 1964

FROM : Roy S. Decker, Head, Soil Mechanics Laboratory, SCS, Lincoln, Nebraska 68506

SUBJECT: Connecticut WP-08, Spaulding Pond Brook, Site No. 1

ATTACHMENTS

1. Form SCS-353, Filter Material, 1 sheet.
2. Form SCS-372, Recommended Use of Excavated Material, 1 sheet.

The completed Geology Report and Investigational Plans were received here on April 9, 1964. We have reviewed the information and logs.

INTERPRETATION AND DISCUSSION OF DATA

FOUNDATION MATERIALS:

A. Classification and Description: The bedrock at the site is gneiss which is highly weathered and fractured in some places. The weathering is extremely variable -- no pattern can be distinguished. The ridging seems to run from northeast to southwest. The artesian effects may be caused by this variable weathering. In the abutments, weathered rock is at or close to the surface.

The soil mantle in the floodplain just above rock is a till. The material appears to be a non-plastic, gravelly sand. (All three borrow materials classed as such.)

A surface of cover of up to 5' of organic muck is generally present across the floodplain.

B. Density from Blow Count: From blow count and description, it appears that all materials below the surface "muck" are quite dense. Blow count ranged from about 1 per foot to 10 per foot in the surface and was generally over 40 per foot in the till.

C. Consolidation: If the low density, organic surface material is removed, there will be little consolidation potential and no settlement or spreading problem should exist.

Rock weathering along the proposed conduit location is irregular, but blow count indicates actual differentials in consolidation potential should be low under the fill height proposed.

D. Permeability: Both the till and the weathered rock are permeable and an effective drain is essential to assure against failure from piping.

Seepage losses may be high through the most fractured rock like that found in TH # 1 and # 3 on the right abutment. In the floodplain, seepage losses may be largely controlled by the blanketing of "muck".

E. Shear Strength: Below the low density surface, the gravelly sand, based on blow count, is extremely strong and no foundation failure appears possible if the surface is removed.

EMBANKMENT MATERIALS:

A. Classification: Three borrow samples were received. They are all classed as non-plastic SM. Gravel content varied from 16% to 30% of the minus 3" material. About 5% to 10% of cobbles and boulders were visually estimated to be present.

B. Compacted Dry Density: Standard Proctor compaction on the minus # 4 material yielded maximum densities of 115.0 p.c.f. to 117.5 p.c.f. Placement of the materials as sampled at 95% of Standard would yield dry densities of 115.0 p.c.f. to 124.5 p.c.f. when corrected for the gravel shown.

C. Permeability: Tests on material compacted to 95 percent of Standard yielded 0.5 ft./day on a sample from this site, 64W2533 (TH # 164), and also on one from Site No. 2. This indicates a moderately low permeability for the compacted fill as compared to the weathered rock or more permeable areas of till.

D. Shear Strength: A consolidated, undrained triaxial test was made on the minus # 4 portion of 64W2533. The material was a little over 95% of Standard for the test. Shear values of $\phi = 37°$, $c = 0$ were found. At just 95% of Standard and fully saturated, these values should still be at least $\phi = 35°$ and $c = 0$, which are recommended as minimum design values.

E. Consolidation: Very little consolidation is expected in compacted fill of these materials.

3 -- T. R. Wire -- 4/13/64
Rey S. Decker
Subj: Connecticut WP-08, Spaulding Pond Brook, Site No. 1

SLOPE STABILITY ANALYSIS:

The proposed slopes were analyzed by an infinite slope method against shallow surface failure from rapid drawdown. Based on a saturated density of 136.0 p.c.f., a 3:1 slope has a safety factor of 1.05 against horizontal flow lines and 1.18 against flow parallel to the surface. This is acceptable, but indicates the most gravelly material should be used in the upstream face.

No danger of sliding failure is anticipated in 3:1 slopes of this type material if uplift is controlled by a satisfactory drain.

RECOMMENDATIONS

A. Site Preparation: All organic "muck" and old fill remains should be removed from under the embankment.

B. Cutoff: A cutoff trench of sufficient depth across the floodplain to assure penetration into dense till is recommended. In the abutments the trench should bottom in reasonably firm rock. A trench depth up to 6' into the fractured rock as found in TH # 1 may be desirable. The exact depth must be set by examination of rock conditions during construction. A 12' bottom width is suggested.

The cutoff should be placed upstream from centerline, but contiguous with the fine center material section so as to provide a continuous membrane of the finer select backfill. The fine section can be placed on a sloping section as shown on Form SCS-372 attached.

Backfill with the finest material available placed at 95% of Standard density.

C. Principal Spillway: The proposed location appears to have acceptable foundation conditions. Low density materials should be removed down to material with blow count over 40 per foot and the trench backfilled to the pipe base.

Care should be taken to assure that no hard gniess protrudes into the probable plunge basin area. Any found should be removed to full plunge basin depth.

Consolidation under the pipe will be a minimum as will horizontal strain.

Use $\phi = 38°$ to represent strength of moist compacted embankment for conduit loading in design.

Rey S. Decker
Subj: Connecticut WP-08, Spaulding Pond Brook, Site No. 1

D. Drainage: A trench drain at c/b = 0.6 with a perforated pipe outlet is recommended to prevent piping and assure control of the phreatic line in the embankment.

The trench should bottom well into the most gravelly till across the floodplain and into the fractured rock face in both abutments.

It should extend laterally up both abutments to permanent pond level (elevation 241.0).

Filter material should be a coarse sand-gravel as shown on Form SCS-353 attached hereto.

The filter material should be wrapped entirely around the conduit to assure relief of any seepage tending to follow the pipe.

E. Embankment Design: The following is recommended:

1. Selectively place the firm borrow in the core trench and a center membrane as shown on Form SCS-372 attached hereto.

2. Place all materials at 95% of Standard density. Rock corrections should be considered for field control of density. Moisture control is not critical in this type of fill materials.

3. Make embankment slopes 3:1 on both sides as proposed with a drain downstream at c/b = 0.6.

4. Provide overfill of 1.0' over the floodplain to compensate for any residual settlement which may occur.

Prepared by:

Roland B. Phillips

Attachments

cc: T. R. Wire
N. Paul Tedrow, Storrs, Connecticut
W. M. Brown, Storrs, Connecticut
H. M. Kautz, Upper Darby, Pennsylvania

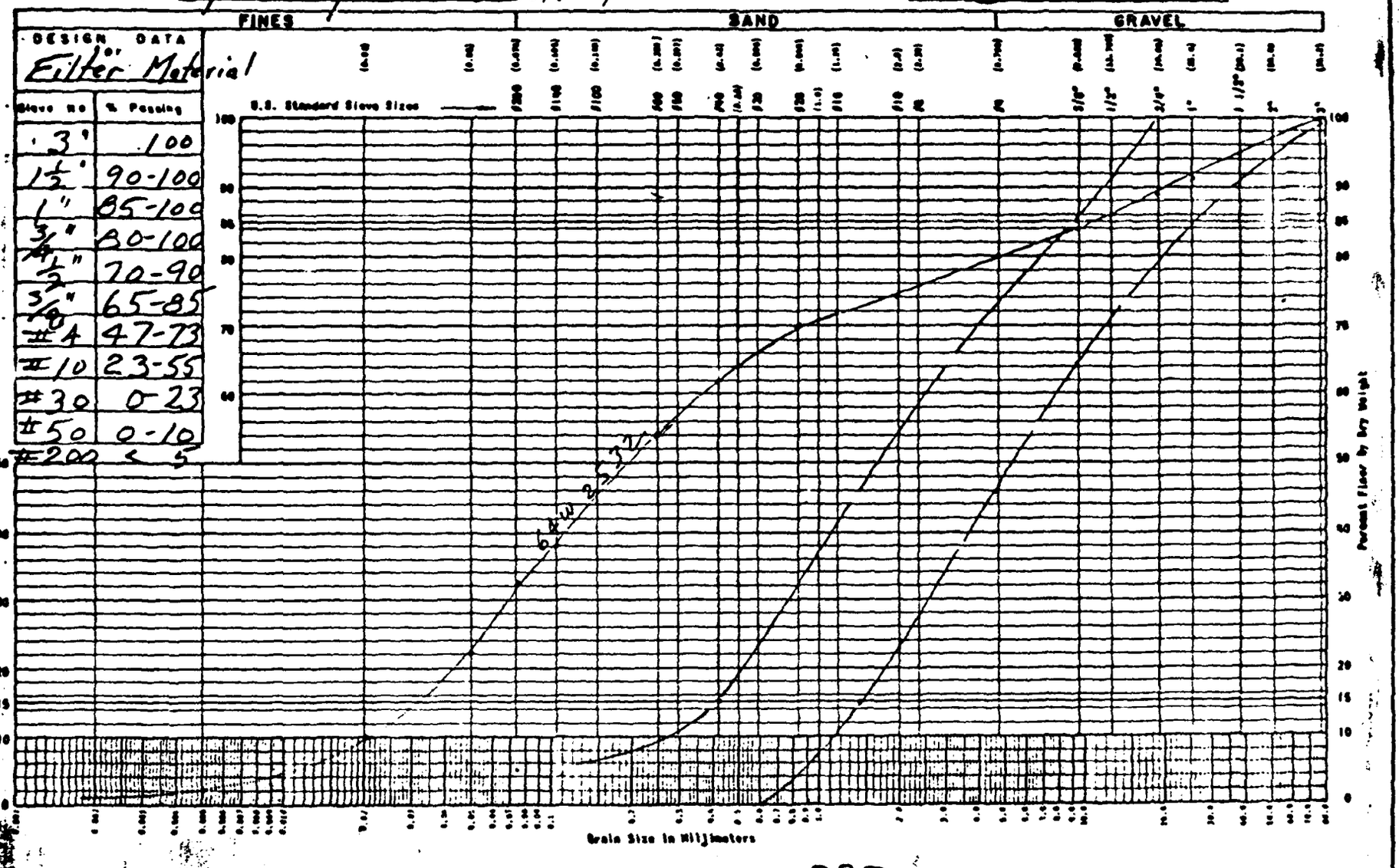
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GRAIN SIZE DISTRIBUTION GRAPH

Project: Spaulding Pond Brook #1 Location: Conn.

DESIGN DATA
Filter Material

Sieve No	% Passing
3"	100
1½"	90-100
1"	85-100
¾"	80-100
½"	70-90
⅜"	65-85
#4	47-73
#10	23-55
#30	0-23
#50	0-10
#200	< 5



ROP - 4-11-64

Sheet No. ___ of ___

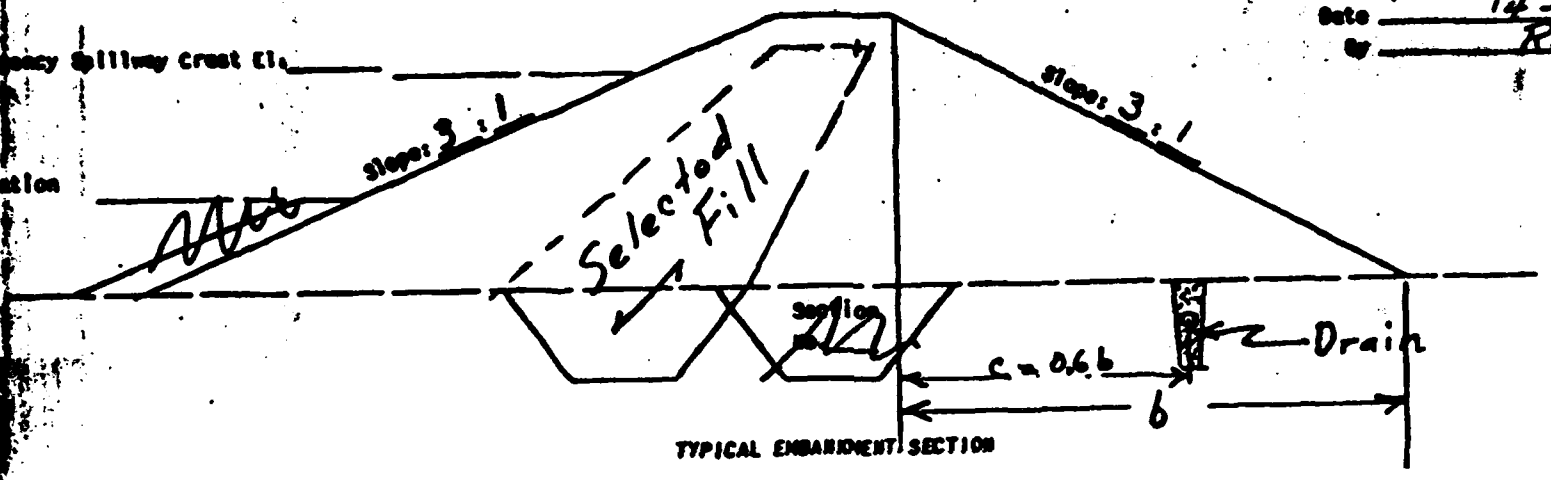
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

(5-77)

RECOMMENDED USE OF EXCAVATED MATERIAL

☐ Formal Zoning Plan ☒ Selective Placement Plan

State Conn.
Project Spaulding Pond Project 1
Date 14-11-64
By R.R.P.



TYPICAL EMBANKMENT SECTION

Embankment Section		Source of Fill Material				Lab Test			Compaction Requirements Class of Fill 1-2		
Zone or Unit	Description	Location	Ave. Depth From	Ave. Depth To	Lab. Sample No.	Standard Max. Den.	Standard Optm. Moist.	Curve No.	Minimum Density Lbs. per Cu. Ft.	Moisture Range Percent From	Moisture Range Percent To
	All. Fill SM	Borrow	—		64-2532	115.5	12.5	(1)	* 109.5	8	14
			—		64-2533	117.5	10.0	(2)	* 111.5	8	14
			—		64-2534	115.0	16.0	(3)	* 109.0	8	14
		* Note - Rock correction needed for plus #4 size material.									

GEOLOGY REPORT

SPAULDING POND BROOK WATERSHED
NORWICH, CONNECTICUT
SITE NO. 1

Concurred by:

T. R. Wire
State Conservation Engineer
Storrs, Connecticut

Prepared by:

W. M. Brown, Geologist
Storrs, Connecticut
March 1964

I. Introduction

A. General

State: Connecticut Location: New London County

Watershed: Spaulding Pond Brook Funds: (WP-08)CN

Site: Site No. 1

Investigated by: William M. Brown, Geologist

Date: March 1964 Hazard: High

Equipment: 1 Tractor-Mounted Backhoe; 1 Skid Mounted Acker Drill

Site Data:

Drainage Area: 0.273 sq. miles; 173 acres

Type Structure: Compacted Earth

Height of Dam: 26 feet; Length: 260 feet

Volume of Fill: 45,000 cubic yards (including Dike)

Location of Emergency Spillway: Right Abutment

REFERENCE:

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DRAWING NO. CT-424-3
SHEET 1 OF 8
DATE April 1964

STORAGE ALLOCATION

	Depth at dam (feet)	Surface area (acres)	Volume (ac.ft.)
Sediment :	Sediment storage requirements are exceeded by the storage capacity of the permanent pool.		
Floodwater :	25	16.0	65

B. Surface Geology and Physiography

Spaulding Pond Brook - Site #1 is located in the eastern portion of Connecticut in the metamorphic highlands. It is set in an area of moderate topographic expression. The proposed structure will replace the remnants of a previous dam which breached in the Spring of 1963. The embankment material of the earlier dam is to be removed. The approximate slopes of the right and left abutments are 20 and 18 percent respectively.

Surface materials are of glacial origin and consist primarily of heterogeneous boulder till. The thickness of the till varies ranging from a veneer where bedrock outcropping predominates to depths of approximately 30 feet in pre-glacial valleys. Bedrock outcrops frequently throughout the site area. It is a garnetiferous-biotitic quartz gneiss with some schist phases of the extensive Putnam Gneiss formation. No measurable strike and dip is possible to indicate a regional trend because of the distortion of the bedrock. In general at the site that which is exposed has a southwestly strike with a high angle (+80°) dip to the northeast. No erosional problems are anticipated with the proposed work of improvement.

II. Subsurface Geology

A. Centerline of Dam

Eleven holes were drilled at or near the centerline of dam to evaluate foundation materials and to delineate existing bedrock. Only 3 holes (Nos. 1, 8 and 10) were drilled on the proposed centerline. The remaining holes were drilled either upstream or downstream of the centerline because of the presence of the old embankment. Three holes (Nos. 1, 2 and 3) were drilled on the right abutment. Holes 1 and 2

GEOLOGY REPORT

were cored from the surface in exposed bedrock. Hole 1 is on the centerline whereas Hole 2 is 15 feet upstream. The condition of the bedrock varied from a highly fractured gneiss with frequent sand seams and voids in Hole 1 to a rather sound substantial gneiss in Hole 2. The rock displayed numerous horizontal and high angle to near vertical fractures. Oxidation was also common to many of the fracture faces. Hole 3 located 15 feet downstream from the proposed centerline penetrated an 8.0 foot soil mantle before refusal to the sampling spoon was met. The mantle material ranged from very fine to fine grained sand with some coarser material. Subangular quartzitic fragment were also common throughout. A ten foot penetration was made in these holes as were all others drilled because of the generally poor condition of the parent rock. Holes 4 and 5 were drilled at the downstream toe of the existing structure. Hole 4 (drilled at the break of the right valley side and floodplain) penetrated 8.5 feet of very fine to fine grained silty sand with subangular gravel sizes. The blow count did not exceed 7 blows per foot for the first 6 feet. Thereafter until refusal the blows were substantial. Artesian conditions were found in Hole 4. Additional casing was added to determine the degree of hydrostatic head. The water rose 0.3 feet in the casing i.e., above ground level and maintained this height for a 24 hour period. Hole 5 was likewise drilled at the downstream toe near the breach. Hole 5 is located approximately 30 feet from both the centerline of the proposed structure and from Hole 4. The hole penetrated 33.0 feet of earth before encountering a very steeply dipping bedrock. The material was primarily a fine to medium grained silty sand, poorly graded with varying amounts of fragmental rock. Some "mucky" or organic traces were also in evidence for the first 6 feet with an associated organic odor. Bedrock was in fairly good condition possessing some minor horizontal fracturing. Hole 5 with its depth of 33 feet in earth before encountering bedrock constituted the deepest penetration for all holes drilled.

Holes 6 and 7 were drilled at the upstream toe approximately in line with Holes 4 and 5. Hole 6 which is upstream of Hole 4 went to a depth of 22 feet of which 12 feet was earth or drive sampling. The first foot was organic silt and "muck" grading into a very fine to fine grained silty sand. Boulders were common throughout the first 6 feet and difficulty in getting the casing resulted. Hole 7 upstream from Hole 5 went through 3 feet of water and then 2 feet of

GEOLOGY REPORT

muck and decayed vegetation. At 5.0 feet a fine grained poorly graded dense sand was entered with a high blow count which was maintained until refusal was met at 28.0 feet. The bedrock was badly fractured with oxidation along the fracture faces. Artesian water was detected at 28 feet. The water flowed from 0.5 feet above the casing or 3.5 feet above pond bottom. This was maintained for a one hour period at which time flow subsided. Hole 8 was drilled in the breach of the existing dam. Refusal was met at 15.0 feet with essentially the same type materials being encountered as in the previous holes. Hole 9 is located approximately 25 feet upstream from the proposed centerline. Refusal at bedrock was at 4.0 feet with the material being the same as that previously described. Hole 10 which was drilled on the centerline upper abutment also went 4.0 feet before bedrock. No drive sample could be obtained however because of the abundance of boulders. Hole 11 was drilled about 27 feet below the centerline in an approximate alignment with Hole 9. Refusal at bedrock was at 6.6 with the materials being similar to those described in the forgoing holes. The bedrock contains high angle fracturing with the fracture faces being well oxidized.

B. Centerline of Outlet Structure

Four holes were drilled along an axis paralleling that of the principal conduit. In addition Holes 5 and 7 were also close enough to the proposed axis so as to provide correlatable data. Hole 301 (at the upstream toe) had a 2 foot water depth. From 2.0 to 4.5 feet is a black organic "mucky" silt which was penetrated without blow count but with the weight of the 140# hammer. From 4.5 to 8.2 is a fine grained poorly gray sand. Blow count advanced to 42 blows per foot from 6.5 feet. Refusal was at 8.2 feet. Rock was cored from 8.2 to 18.2 feet. Hole 302 at the approximate location of the riser went to a depth of 14.3 feet where bedrock was encountered. Water depth was 4.0 feet underlain by organic silt to a depth of about 5.0 feet. Fine grained poorly graded sand with a medium to coarse fraction predominated to refusal. Artesian conditions were detected at the approximate bedrock level. Water rose to a height of 1.2 feet in the casing and maintained this height for 16 hours. Bedrock was well fractured with horizontal and high angle fractures. Hole 303 located 60 feet below the proposed centerline of dam contained boulder and fill for the first 5 feet. A very dense subsoil as determined by blow count was maintained throughout the hole.

GEOLOGY REPORT

The blow count at each of the sampling intervals was in excess of 50 blows per foot. Refusal was at 27.8 feet whereupon at well fractured gneiss was penetrated. Hole 304 was located about 90 feet below the centerline at the limit of the downstream toe. The blow count for the first 4.0 feet was low - not exceeding 10 blows per foot. Thereafter a high blow count was maintained. Nested boulders were found from 15.0 to 20.0 feet prohibiting recovery from the split spoon sampler. Refusal was at 20.0 feet - again with the underlying gneiss being well fractured.

C. Emergency Spillway

Eight holes were drilled within a relatively small area to evaluate materials and delineate the bedrock surface. The materials encountered in all holes were essentially the same. They ranged from an predominantly very fine to fine grained poorly graded silty sands with coarser sands and gravels constituting a minor fraction. Small boulders and cobbles were also found in the holes. The spillway area which presently serves as a parking lot was once a duck pond having since been filled in. The most varying factor in the spillway drilling was the erratic bedrock profile. Bedrock ranged from surface outcropping at the east fringe of the spillway to 19.7 feet in depth in Hole 202. The bedrock contains numerous high angle to horizontal fractures. An artesian condition was hit in the bedrock drilling of Hole 202 at 25.0 feet but this dissipated after a few hours.

D. Borrow Areas

Three borrow areas are presently being considered at Site #1. These have been designated as areas A, B, and C. Twentysix backhoe pits were dug throughout the site area in attempt to delineate that which is most practical and usable. The materials have been tentatively identified as SM with varying degrees of fragmental rock.

SPAULDING POND BROOK

WATERSHED PROTECTION PROJECT

DESIGN REPORT

DAM NO. 1

NORWICH, CONNECTICUT

U. S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

May 1964

ENGINEERING & WATERSHED
PLANNING UNIT
UPPER DARBY, PA.

This flood [illegible] located on Spa[illegible], [illegible], Connecticut. Sheet 1 of the construction drawings may be used to locate the structure.

A summary of pertinent design information is given on sheet 2 of this report.

Criteria and procedures used in this design are given in the following Soil Conservation Service publications:

National Engineering Memorandum No. 27, Limiting Criteria for the Design of Earth Dams
National Engineering Memorandum No. 42, Reinforced Concrete Pipe Drop Inlet Barrels
National Engineering Handoook No. 4A, Hydrology
National Engineering Handbook No. 5, Hydraulics
National Engineering Handbook No. 6, Structural Design
National Engineering Handbook No. 8, Geology
Engineering Division Technical Release No. 2, Earth Spillways
Engineering Division Technical Release No. 5, Structural Design of Underground Conduits
Engineering Division Technical Release No. 12, Procedure for Computing Sediment Requirements for Retarding Reservoirs
Weather Bureau Technical Paper No. 29

This structure is one of two flood retention structures designed to reduce flood damage in the flood plain. It will retard a 100-year frequency storm without discharge occurring in the emergency spillway. This structure also will have a permanent pool with a surface area of approximately 13 acres which will provide a lake for recreational purposes.

The results of hydrologic and hydraulic computations are given on sheet 3 of this report.

The structure consists of a compacted earth fill with a cutoff extending down to rock in the foundation. A drainage system is located under the downstream portion of the earth fill to collect seepage.

The principal spillway is a drop inlet structure consisting of a reinforced concrete riser, 36-inch diameter concrete water pipe, and an impact type energy dissipator at the outlet end of the conduit.

The emergency spillway is designed as a paved parking area that extends far enough downstream from its control section to discharge flow safely [illegible] the slope of the [illegible] embankment.

[illegible] ED PLANNING UNIT, UPPER DARBY, PA

U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

DESIGN REPORT SUMMARY

I.	**Watershed data**		
	A. Structure No.	(a)	
	B. **Drainage area**	0.26	Ac.
	C. Time of concentration - T_c	1.1	Hrs.
	D. Hydrologic curve number - C_n		
	1. Moisture condition II	75	
	2. Moisture condition III	91	
II.	**Principal spillway**		
	A. **Conduit**		
	1. **Size (I.D.)**	30	In.
	2. **Length**	127.33	Ft.
	B. **Riser**		
	1. **Size**	2.5 x 7.5	Ft.
	2. **Height**	21.8	Ft.
	C. **Weir length**	15	Ft.
	D. **Orifice size**	9 x 12	In.
	E. **Pond drain size**	18	In.
	F. **Type of energy dissipator**	impact type	
III.	**Emergency spillway**		
	A. **Width**	80	Ft.
	B. **Side slopes**	2-1/2:1	
	C. Length of level section	20	Ft.
	D. Exit slope	.04	Ft/Ft.
	E. Maximum velocity at control section (D.H.W.)	6.9	Ft/Sec.
	F. Duration of flow (D.H.W.) through emergency spillway	9.7	Hrs.
	G. Frequency of use - less frequent than once in a 100 years		
IV.	**Earth fill**		
	A. **Height**	30.5	Ft.
	B. **Volume**	25,473.78	C.Y.
	C. **Compaction**	B-2	
V.	**Dike**		
	A. Height	19.5	ft.
	B. Volume	20,036.80	c.y.
	C. Compaction	B-2	

ENGINEERING AND ADVANCED PLANNING UNIT, UPPER DARBY, PA

U S DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

Element of Structure	Determining Factor	Elevation	Surface Area Acres	Storage		Inflow		Peak Outflow c.f.s.
				Acre-Feet	Inches*	Volume Inches*	Rate c.f.s.	
Invert of orifice	50-year sediment accumulation	241.00	12.7	138.8[1]	-	-	-	-
Crest of riser	Priming head for principal spillway	244.80	15.4	52.9[2]	3.81	-	-	-
Crest of emergency spillway	100-year frequency storm, moisture condition III	246.00[3]	16.3	72[2]	5.20	4.08	289.5	17
Design high water	1.5 X 6-hour point rainfall, moisture condition III	247.75	17.2	105[2]	7.57	15.38	1024	675
Top of dam	2.5 X 6-hour point rainfall, moisture condition II	250.50	19.4	117[2]	8.44	21.40	1479	1142

*Inches of runoff from controlled area of 166 acres.
Time required to empty flood storage is 3.6 days

1/ Sediment and recreation storage.
2/ Does not include sediment or recreational water storage.
3/ This is 1.2 feet higher than required by criteria. It provides less frequent operation of the emergency spillway.

ENGINEERING & WATERSHED PLANNING UNIT, UPPER DARBY, PA.

Sheet

Copies of the publications referred to in this report may be obtained from Mr. [illegible], State Conservationist, USDA, Soil Conservation Service, Storrs, Connecticut.

Concurred:

Gerald E. Oman
Design Engineer

T. R. Wire
State Conservation Engineer

Vincent McKeever
Hydrologist

Robert F. Fonner
Geologist

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE
Old Bookstore Building
Storrs, Connecticut 06268

June 2, 1964

Mr. John J. Curry
Chief Engineer
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Dear Mr. Curry:

Following my discussion with you and Mr. Macchi regarding Spaulding Pond Brook, Site 1, the points of our discussion were reviewed with our technical unit and it was agreed that the following three adjustments would be made on the contract prints:

1. Move the rock embankment drain 12 feet horizontally toward center line of the embankment.

2. Show delineation of a central selected impervious fill as indicated on the laboratory report.

3. Show delineation for 3 feet depth selected pervious fill on the downstream slope.

These points were reviewed by 'phone with Mr. Skogl d this afternoon, on which tentative concurrence was provided. It is hoped that this adjustment will meet all requirements and that construction permit will be issued, so that we can order construction plans for this site.

With the time limitation that we have, if it is possible we would appreciate receiving clearance on this site by 'phone.

Sincerely yours,

T. R. Wire
State Conservation Engineer

cc:
Mr. A. J. Macchi

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Storrs, Connecticut 06268

September 16, 1964

Mr. William S. Wise
Director
Water Resources Commission
State Office Building
Hartford, Connecticut 06106

Dear Mr. Wise:

As stipulated in your instructions received with the construction permit for Site 1, Spaulding Pond Dam, Spaulding Pond Brook Watershed, this is to officially notify you that construction started on August 25, 1964.

The Soil Conservation Service has assigned myself as Government Representative, and Walter J. Nyquist as Construction Inspector.

Please excuse the delay of this notification. Due to an oversight, a copy of the construction permit only recently reached our office.

Sincerely yours,

William H. Leeming, Jr.
Government Representative

cc: M. P. Tedrow
J. Fitzgerald

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Storrs, Connecticut 06268

September 25, 1964

Mr. William S. Wise
Director
Water Resources Commission
State Office Building
Hartford, Connecticut 06106

Dear Mr. Wise:

As stipulated in your instructions received with the construction permit for Site No. 1, Spaulding Pond Brook Watershed, Norwich, Connecticut, this is to officially notify you that the foundation excavation is substantially complete. Cutoff trench excavation begins today and blasting of rock, required for foundation preparation, will take place for the next few days.

Sincerely yours,

William H. Leeming Jr.

William H. Leeming, Jr.
Government Representative

cc: N. P. Tedrow
J. Fitzgerald

A. J. MACCHI • ENGINEERS

DR. GIULIO PIZZETTI — ASSOCIATE CONSULTANT

44 GILLETT STREET — HARTFORD, CONN. — PHONE 525-8631
17 CORSO DUCA ABRUZZI — TORINO, ITALY — PHONE 519-473

N.S.P.E. — A.S.C.E. — A.C.I.

November 13, 1964

State of Connecticut
Water Resources Commission
State Office Building
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. Sander

Re: Spaulding Pond Dam
Norwich, Connecticut

Dear Mr. Sander:

I inspected the above project on Friday, November 13, 1964. Present was Mr. Geer, the project superintendent.

The contractor has completed placing fill material and toe trench drain at the dike. At the dam the contractor has installed the rock drain and pervious filter blanket at the downstream toe and has placed the principal spillway pipe, pond drain and outlet impact basin. He was spreading and compacting fill around the spillway pipe and across the dam section.

The walls of the concrete spillway riser were being placed. The work in progress observed by this office at this inspection was satisfactory.

Very truly yours,

A. J. MACCHI, ENGINEERS

I. R. SKOGLUND, P. E.

A. J. MACCHI • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE 525-6631

A. J. MACCHI
M. BINGHAM
H. R. HOFFMAN
I. R. SKOGLUND

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

July 21, 1965

State of Connecticut
Water Resources Commission
State Office Building
165 Capitol Avenue
Hartford, Connecticut

Attention Mr.Sander

Re: Spaulding Pond Dam
Norwich, Connecticut

Dear Mr. Sander:

Attended the final inspection of the above-referenced project on Tuesday, July 20, 1965. Present were Mr. Ferguson and his staff, Mr. Geer, the General Contractor, officials and reporters from the City of Norwich.

An inspection tour was made of the main dam, emergency spillway and dike. Workmen were clearing brush in the pond basin in preparation to filling the pond.

The completed work observed by this office at this inspection was satisfactory.

Very truly yours,

A. J. MACCHI, ENGINEERS

I. R. Skoglund

I..R. SKOGLUND, P. E.

STATE OF CONNECTICUT

WATER RESOURCES COMMISSION

[illegible] • Hartford 15, Connecticut

CERTIFICATE OF APPROVAL

September 26, 1967

City of Norwich

Norwich, Connecticut

TOWN: Norwich
RIVER: Shetucket River
TRIBUTARY: Unnamed
CODE NO.: T14.7 S0.2 U1.8

NAME AND LOCATION OF STRUCTURE:

Spaulding Pond Dam located in Mohegan Park

DESCRIPTION OF STRUCTURE AND WORK PERFORMED:

An earth dam with drop inlet spillway built in accordance with plans prepared by the Soil Conservation Service dated May 1964 and revised June 8, 1964.

CONSTRUCTION PERMIT ISSUED UNDER DATE OF:

June 19, 1964

This certifies that the work and construction included in the plans submitted, for the structure described above, has been completed to the satisfaction of this Commission and that this structure is hereby approved in accordance with Section 25-114 of the 1958 Revision of the General Statutes.

The owner is required by law to record this Certificate in the land records of the town or towns in which the structure is located.

WATER RESOURCES COMMISSION

BY: [redacted], Director
John J. Curry

14

No. _____ WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

CT-202

Inventoried By _____

Date FEB 25, 1974

Name of Dam or Pond SPADINI P.D. SITE #1

Code No. _____

Nearest Street Location MONEGAN PARK RD

Town NORWICH

U.S.G.S. Quad. NORWICH LONG 72°-04.2'

Name of Stream UNNAMED LAT. 41° 32.8'

Owner CITY

Address _____

Pond Used For REC DA 0.75SM

Dimensions of Pond: Width _____ Length _____ Area 2 AC

Total Length of Dam 820 Length of Spillway 80'

Location of Spillway [illegible]

Height of Pond Above Stream Bed 23'

Height of Embankment Above Spillway 5

Type of Spillway Construction EARTH

Type of Dike Construction EARTH

Downstream Conditions SITE #2, PONDS & CITY

Summary of File Data [illegible] RUSH [illegible] RIP RAP

Remarks _____

Would Failure Cause Damage? _____ Class _____

Sherm

August 12, 1975

Robert G. Halstead
State Conservationist
Soil Conservation Service
Mansfield Professional Park
Storrs, CT. 06268

Dear Mr. Halstead:

On June 23, 1975, Don McArthur, Walter Wadja, and myself inspected the Spaulding Pond Brook Project (WS-PL-566) regarding operation and maintenance. We found that operation and maintenance was satisfactory on all structures.

Sincerely yours,

Sherman Chase

SHERMAN CHASE
District Conservationist

W Wadja

WALTER WADJA
Director of Public Works

SC,WW/ky

INSPECTION REPORT

MOHEGAN PARK DAMS & DIKES

The Spaulding Pond Brook Watershed works of improvement were inspected on July 12, 1977, by Donald McArthur and Gary Packer of the U.S. Soil Conservation Service, and Walter Wadja and Monroe Cilley of the Norwich Department of Public Works.

The following conditions were noted:

Site No. 1 - Fertilize upstream side of main dam - City of Norwich

Site No. 1 - Remove stone and debris from spillway outlet - City of Norwich

Site No. 2 - Remove woody vegetation from dikes - City of Norwich

File #PWD 660-78

CITY OF NORWICH
Connecticut

September 22, 1978

Mr. Gary Parker, Conservationist
United States Soil Conservation Service
562 New London Turnpike
Norwich, Connecticut 06360

Subject: Inspection Report
Mohegan Park Dams & Dikes

Dear Gary:

Pursuant to your inspection of the subject matter on August 23, 1978, in which Monroe Cilley, Superintendent of Parks and Cemeteries, accompanied you, please be advised that the following items have been completed:

Site No. 1 - a) complete mowing of all dikes and embankments.
b) removed weedy vegetation from downstream side of main dam.

Site No. 2 - a) complete mowing of all dikes and embankments.
b) removed woody vegetation from pool area.
c) clean brush away from inlet and outlet of pipe at upstream end of pool.

If you have any questions pertaining to the above, please feel free to call me.

Very truly yours,

Walter J. Wadja
Director of Public Works

WJW:jd

cc: Monroe Cilley
Supt. Parks & Cemeteries

APPENDIX C

DETAIL PHOTOGRAPHS

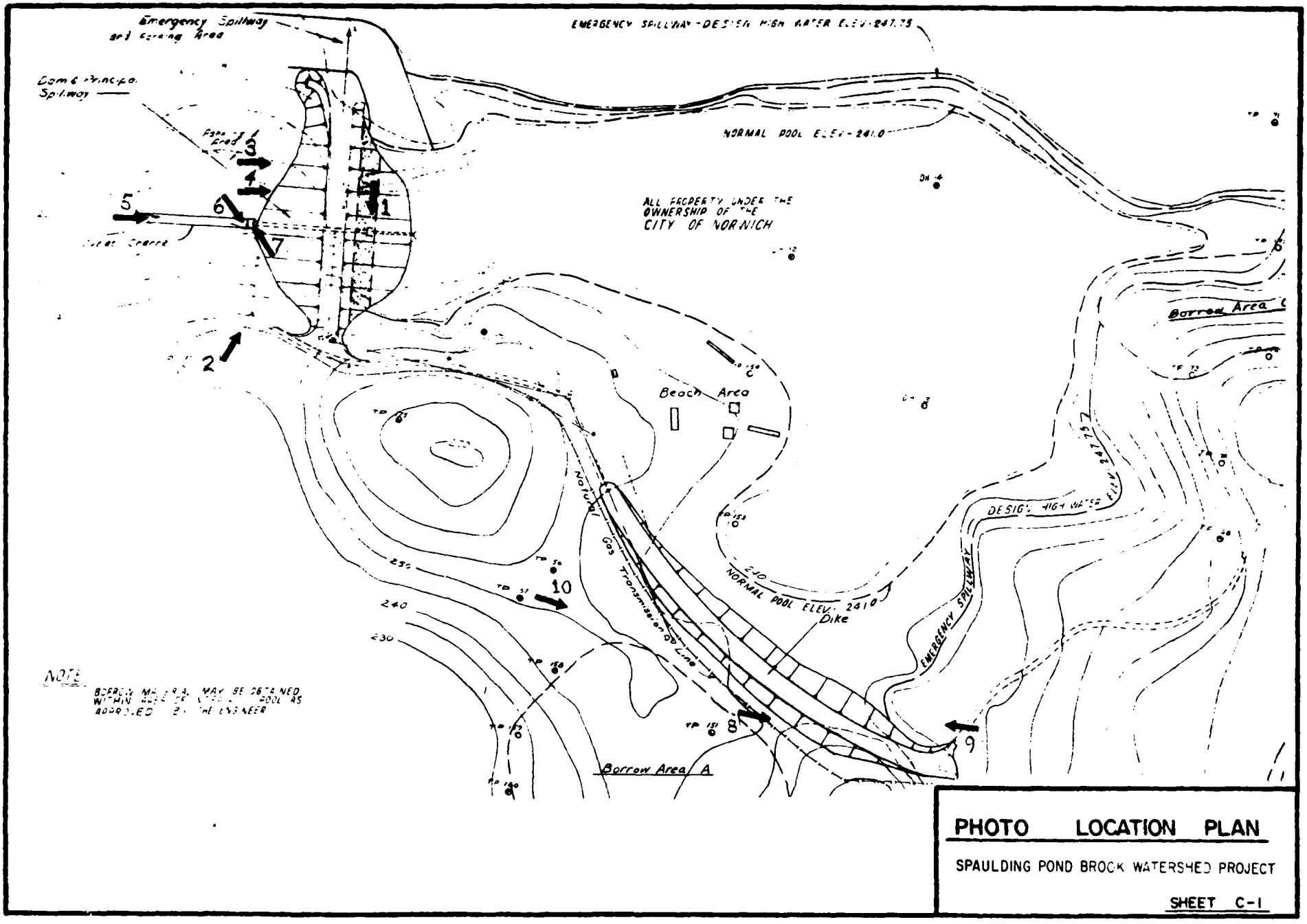


PHOTO LOCATION PLAN

SPAULDING POND BROOK WATERSHED PROJECT

SHEET C-1

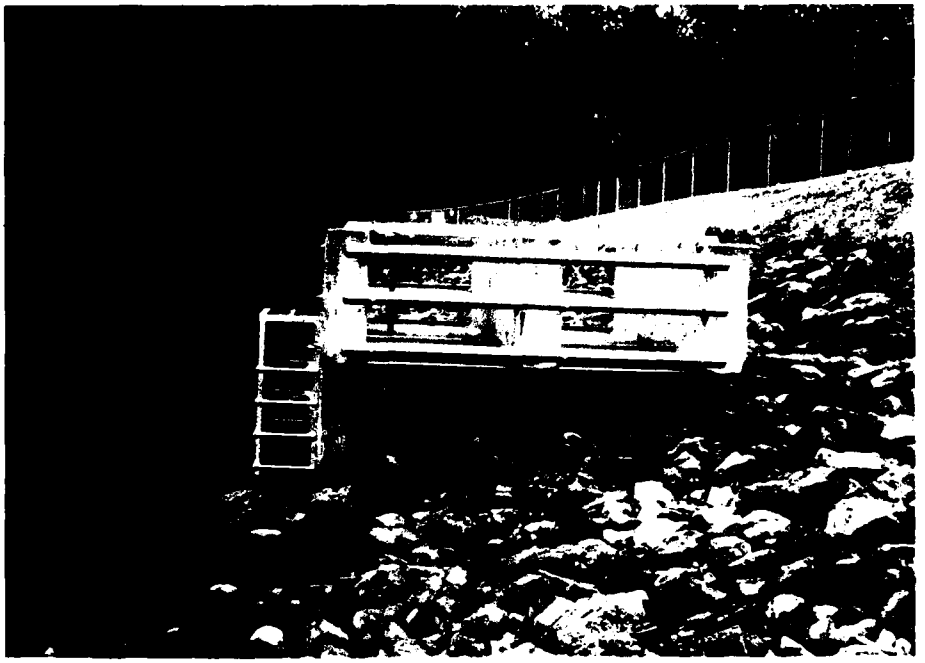


Photo 1 - Principal spillway structure and upstream slope of dam (6/2/80).

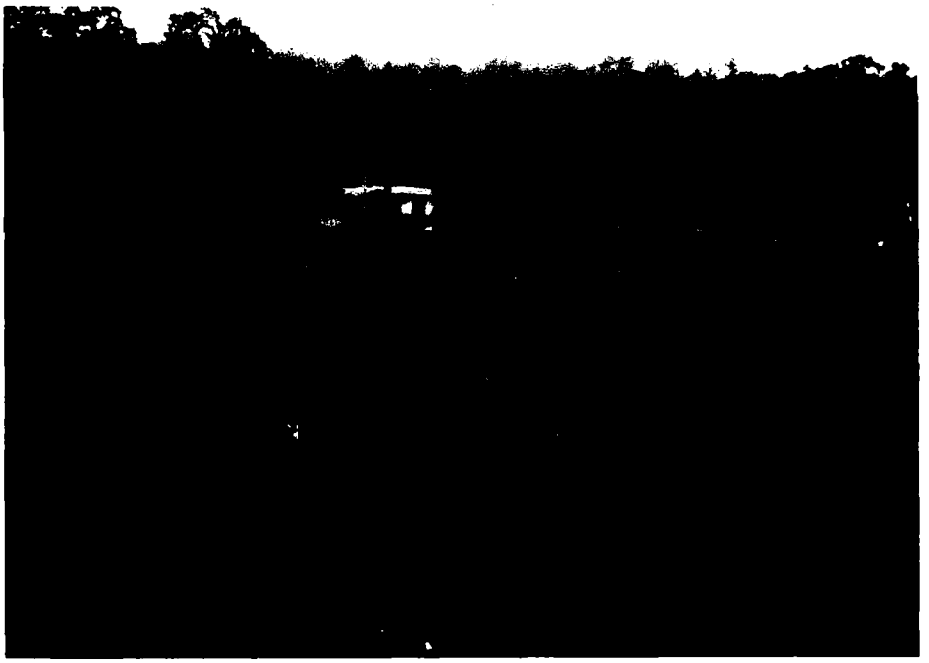


Photo 2 - General view of downstream slope of dam (6/2/80).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	Spaulding Pond Dam Spaulding Pond Brook Norwich, Conn. CE# 27 785 KB DATE July '80 PAGE C-1

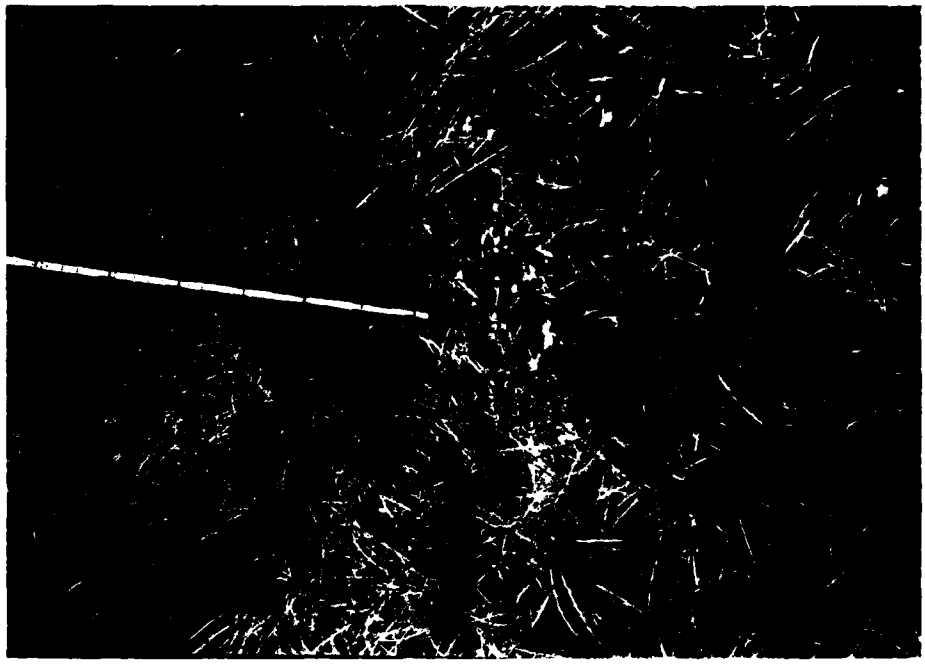


Photo 4 - Small depression at toe of downstream slope (6/2/80).

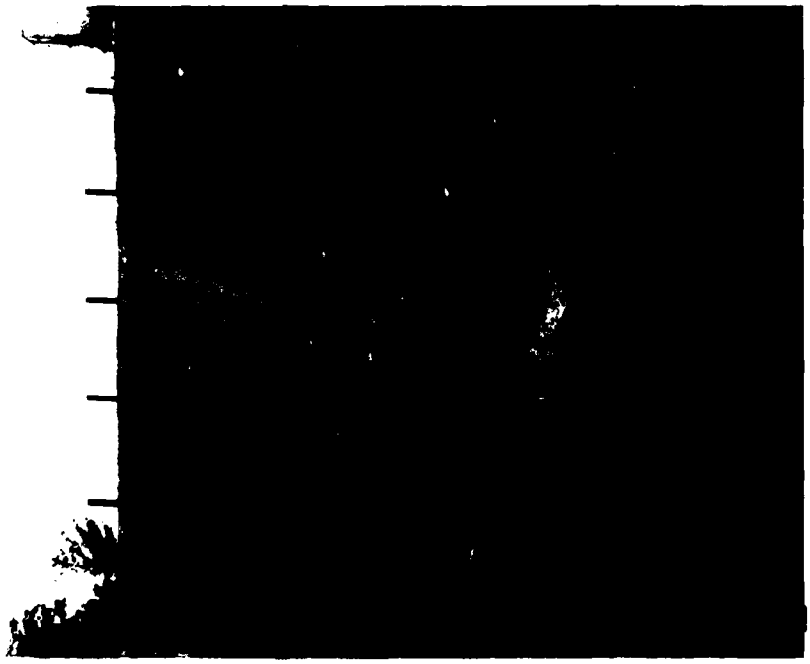


Photo 3 - Area of trespassing on downstream slope (6/2/80).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	Spaulding Pond Dam Spaulding Pond Brook Norwich, Conn.
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	INSPECTION OF NON-FED. DAMS	CE # 27 785 KB DATE July '80 PAGE C-2

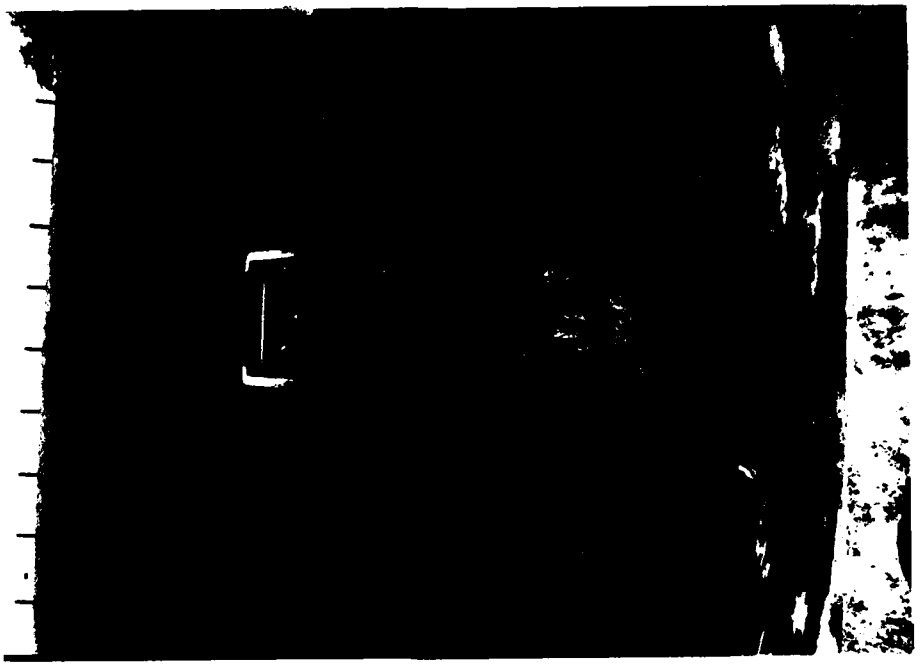


Photo 5 - Concrete impact basin and channel to pipe under parking lot (6/2/80).

Photo 6 - Seepage and erosion at left downstream corner of impact basin (6/2/80).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	Spaulding Pond Dam Spaulding Pond Brook Norwich, Conn.
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	INSPECTION OF NON-FED. DAMS	CE# 27 785 KB DATE July '80 PAGE C-3

Photo 7 - Right toe drain outlet. Note sediments on floor of impact basin (6/2/80).

Photo 8 - Dike toe drain outlet. Note partial blockage of pipe by leaves and sediments (6/2/80).

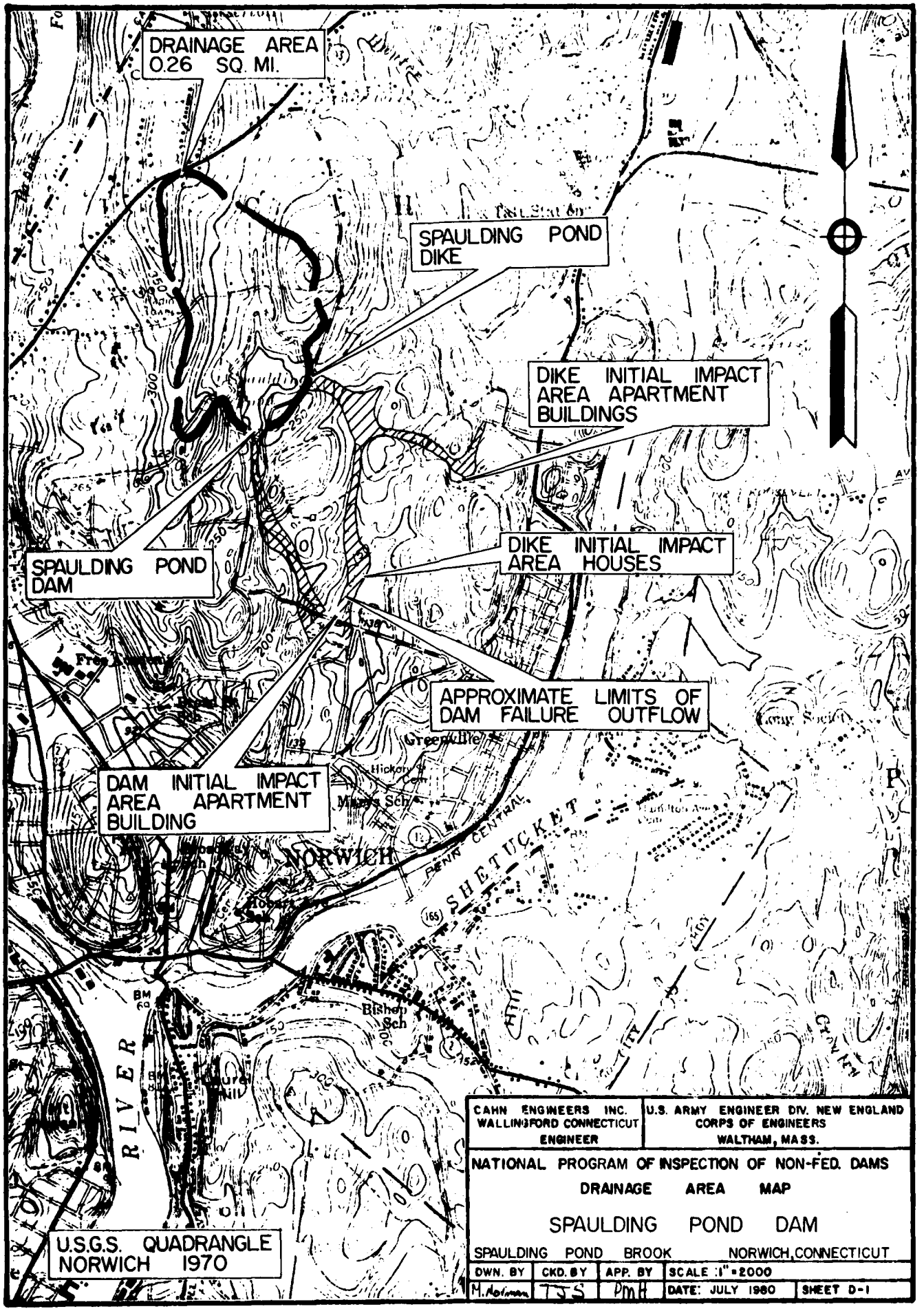
Photo 9 - Upstream slope and top of dike (6/2/80).

Photo 10 - Downstream slope of dike (6/2/80).

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	Spaulding Pond Dike Tr-Sketucket River Norwich, Conn. CE# 27 785 KB DATE July '80 PAGE C-5

APPENDIX D

HYDRAULICS/HYDROLOGIC COMPUTATIONS



CAHN ENGINEERS INC. WALLINGFORD CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DRAINAGE AREA MAP

SPAULDING POND DAM

SPAULDING POND BROOK NORWICH, CONNECTICUT

DWN. BY	CKD. BY	APP. BY	SCALE :1" =2000	
M. Norman	TJS	PmH	DATE: JULY 1980	SHEET D-1

HYDRAULIC/HYDROLOGIC INSPECTION

SPAULDING POND (SITE NO. 1) DAM, NORWICH, CT.

I) PERFORMANCE AT PEAK FLOOD CONDITIONS:

1) PROBABLE MAXIMUM FLOOD (PMF)

a) WATERSHED CLASSIFIED AS "ROLLING" TO "MOUNTAINOUS"

b) WATERSHED AREA: D.A. = 0.26 sq mi

NOTE: D.A. FROM U.S. S.C.S. SPAULDING POND DAM DWG. NO CN-424-P, SHEET #1, MAY 1964: (DA=166 AC.); CONN. DEP BULLETIN N°1, 1972 (GAZETTEER OF NATURAL DRAINAGE AREAS) P. 21 SHOWS D.A.=0.25 sq mi.

c) PEAK FLOODS (FROM NED-ACE GUIDELINES - GUIDE CURVES FOR PMF)

i) FROM GUIDE CURVES: CSM = 3000 cfs/sq mi (EXTRAPOLATION TO D.A. < 2 sq mi AND CSM MAX = 3000 cfs/sq mi)

ii) PMF = 3000 × 0.26 = 780 cfs

iii) ½ PMF = 390 cfs

2) SURCHARGE AT PEAK INFLOWS (PMF AND ½ PMF)

a) OUTFLOW RATING CURVE

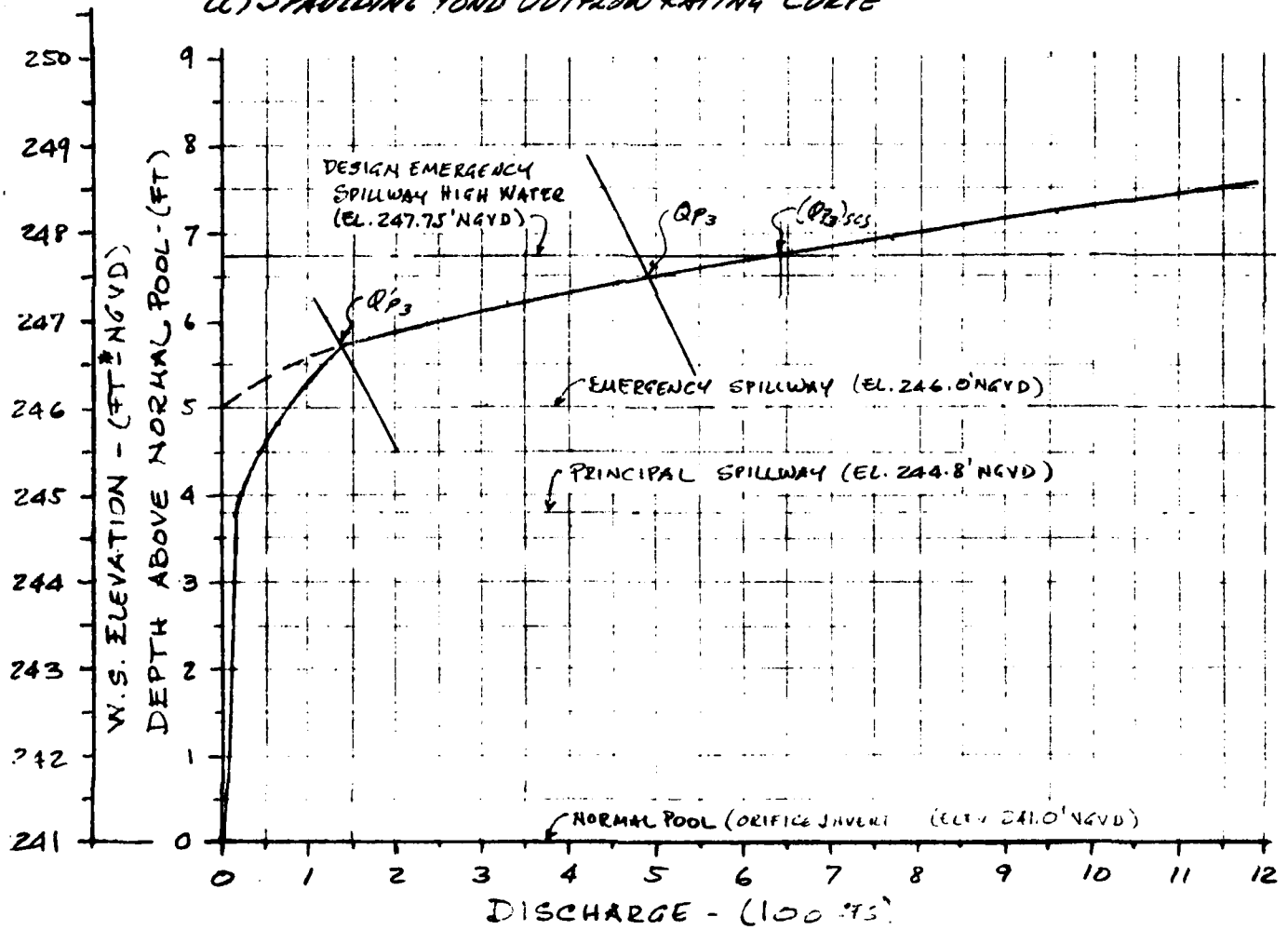
i) SPILLWAY(S) AND OVERFLOW PROFILE OF DAM.

SPAULDING DAM HAS TWO SPILLWAYS: THE PRINCIPAL SPILLWAY (SQUARE WITH WEIR (RISER) CREST AT ELEV. 294.8' NGVD* - TRUE LENGTH L=13' (TOT.) DESIGN LENGTH L=15' (TOT.); AND, THE EMERGENCY SPILLWAY, A DEPRESSION

*NOTE: NATIONAL GEODETIC VERTICAL DATUM (NGVD) ELEVATIONS EQUIVALENT TO THE MSL ELEVS. ON S.C.S. SPAULDING POND DAM CONSTRUCTION DWGS CN-424-P (1964)

AT THE LEFT ABUTMENT OF THE DAM AT ELEVATION 246.0 NGVD (SEE S.C.S. DWGS. Nº CN-424-P, SHEETS 1 TO 14, DATED MAY, 1964) THE DESIGN LENGTH OF THE EMERGENCY SPILLWAY CHANNEL IS L=150' (SEE SCS HYDRAULIC DESIGN JOB Nº CN-424-H, SHEET 5); b_n=80' AND (-) 12.5" AND 15" TO 1' SIDES. NORMAL POOL IS KEPT BELOW THE PRINCIPAL SPILLWAY BY FLOW THRU AN ORIFICE (1.7'W x 1'H) WITH INVERT AT ELEV. 241.0 NGVD.

(ii) SPAULDING POND OUTFLOW RATING CURVE



*SEE NOTE p. D-1

NOTE: DATA FOR OUTFLOW RATING CURVE FROM S.C.S. HYDRAULIC DESIGN COMPUTATIONS (JOB Nº CN-424-H) · SHEETS Nº 3, 4 & 5, DATED 12/23/63 THRU 2/13/64. TOP OF EMBANKMENTS (DAM AND DIKE ON THE POND'S LEFT (EAST) SHORE) IS ELEV. 250.5' NGVD (SEE CONSTRUCTION DRAWINGS)

b) SURCHARGE HEIGHT TO PASS PEAK INFLOWS (Q_{P_1} & Q'_{P_1})

i) @ Q_{P_1} = PMF ≈ 780 CFS $H_1 \approx 7.0'$ (ELEV. 248' NGVD)

ii) @ $Q'_{P_1} = \frac{1}{2}$ PMF ≈ 390 CFS $H'_1 \approx 6.3'$ (ELEV 247.3' NGVD)

c) EFFECT OF SURCHARGE STORAGE - PEAK OUTFLOWS:

i, 1') LAKE AREA AT NORMAL POOL* (ELEV. 241.0' NGVD) $A_{WL} = 13$ AC
2') LAKE AREA AT FLOOD POOL* (ELEV. 246.0' NGVD) $A_{FLS} = 16$ AC
3') FLOODWATER STORAGE* (EL. 241' NGVD TO EL. 246' NGVD) $S_{FW} \approx 72$ AC FT

4') ASSUME LINEAR VARIATION OF AREA WITHIN EXPECTED SURCHARGE. ($\Delta A \approx 0.6$ AC/FT)

*SEE S.C.S. CONSTRUCTION DWGS. - SHEET #1 - (SEE CURVE p. D-4)

ii) WATERSHED D.A. = 0.26 SQ MI (SEE p. D-1)

iv) PEAK OUTFLOWS (Q_{P_3} & Q'_{P_3})

(DETERMINED ON THE OUTFLOW RATING CURVE p. D-2, BY USING THE APPROX. ROUTING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND 19" MAX PROBABLE R.O. IN NEW ENGLAND).

$Q_{P_3} \approx 490$ CFS $H_3 \approx 6.5'$ (ELEV. 247.5' NGVD)

$Q'_{P_3} \approx 140$ CFS $H'_3 \approx 5.7'$ (ELEV. 246.7' NGVD)

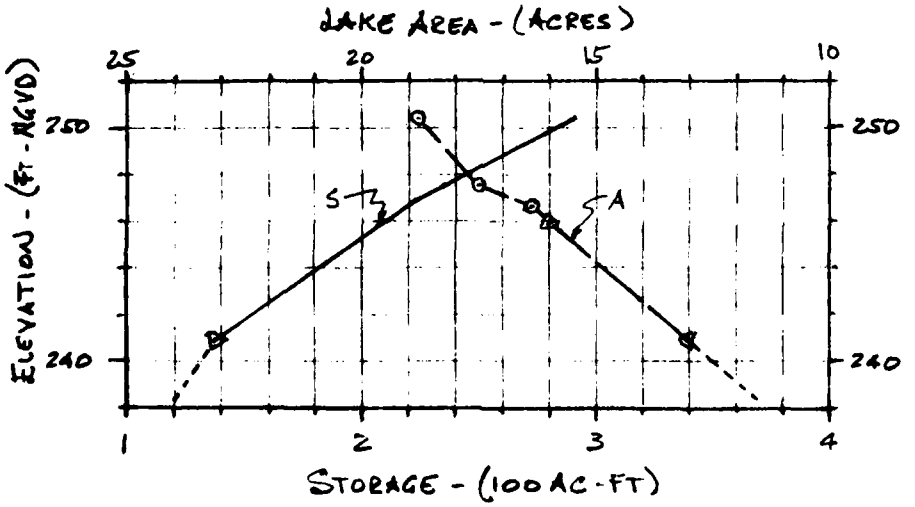
NOTE: S.C.S. DESIGN PEAK FLOWS (SEE EMERGENCY SPILLWAY AND FREEBOARD HYDROGRAPHS - CONP. SHEETS NO 7 & 8, JOB NO CN-422-H) ARE HIGHER THAN THE PMF (p. D-1) ESTIMATED BY EXTRAPOLATION OF THE PEAK FLOOD GUIDE CURVES OF THE NED-ACE GUIDELINES. THEREFORE, THE S.C.S. EMERGENCY SPILLWAY DESIGN HIGHWATER (ELEV. 247.75' NGVD) IS HIGHER THAN THE ESTIMATED PMF POND W.L. (ELEV. 247.5' NGVD). FROM THE RATING CURVE, THE S.C.S. DESIGN PEAK OUTFLOW IS (≈)($Q_{P_{3\,SCS}}$) = 640 CFS.

3) SPILLWAY CAPACITY RATIO TO PEAK OUTFLOWS

SPILLWAY CAPACITY TO:	SURCH* H (FT)	W.S. ELEV. (FT-NGVD)	SPILLWAY CAPACITY (CFS)	SPILLWAY CAPACITY AS % OF PEAK OUTFLOWS	
				Q_{P3} (490 CFS)	Q'_{B_3} (140 CFS)
½ PMF	5.7'	246.7	140	—	100
PMF	6.5'	247.5	490	100	—
TOP OF DAM**	9.5'	250.5	●1142	230	820

*SURCHARGE ABOVE DESIGN NORMAL POOL (ELEV. 241.0 'NGVD)
**TOP OF DAM AND LEFT (EAST) SHORE DIKE (ELEV. 250.5' NGVD)
●FROM S.C.S. RESERVOIR ROUTING TABLE ON "SPAULDING POND BROOK WATERSHED PROTECTION PROJECT - DESIGN REPORT - DAM N.º 1 - NORWICH, CT." DATED [illegible]. EXTENSION OF RATING CURVE (P. D-2) TO TOP OF DAM ELEVATION, GIVES HOWEVER, A TOTAL SPILLWAY CAPACITY OF (±) Q_S = 3400 CFS.

4) LAKE AREA/STORAGE CURVES - SPAULDING POND



Δ DATA FROM SCS DWG N.º CN-424-P, MAY 1964, SHEET #1. ◇ AREAS MEASURED ON SCS DWG. N.º CN-424-P, SHEET #2, SCALE 1"=100'. - SEE pp. D-3 (AREAS) AND D-6 (STORAGE).

SPAULDING POND DAM

II) DOWNSTREAM FAILURE HAZARD

1) POTENTIAL IMPACT AREA

a) SPAULDING POND BROOK, AFTER CROSSING A SMALLER POND, ENTERS A FULLY DEVELOPED AREA OF THE CITY OF NORWICH, (±) 3000' D/S FROM THE DAM. BEYOND THIS POINT (NEAR HOHEGAN PARK ROAD AND NORTH ST.) THE BROOK FLOWS THROUGH A CONDUIT (±) 6000' LONG, TO ITS CONFLUENCE WITH THE SHETUCKET RIVER. AN APARTMENT BUILDING COMPLEX AT THE CONDUIT ENTRANCE WITH F.F. ELEV. (±) 3.5' ABOVE THE BROOK, CONSTITUTE THE INITIAL IMPACT AREA IN CASE OF FAILURE OF SPAULDING POND DAM.

b) APARTMENTS ON BOSWELL ST. AND SANDY LANE AND AT THE END OF CURTIS RD, TO THE SOUTHEAST OF SPAULDING POND, CONSTITUTE THE POTENTIAL IMPACT AREA IN CASE OF FAILURE OF THE SPAULDING POND DIKE AT THE LEFT (EAST) SHORE OF THE POND.

2a) FAILURE AT SPAULING POND DAM:

ASSUME SURCHARGE TO TEST FLOOD CONDITIONS (PMF - SEE P. D-9)
(ELEV. 247.5' NGVD)

a) HEIGHT OF DAM*: $H_d = 30.5'$ (TOE = ELEV. 220' NGVD)

b) MID-HEIGHT LENGTH*: $L_d \approx 214'$

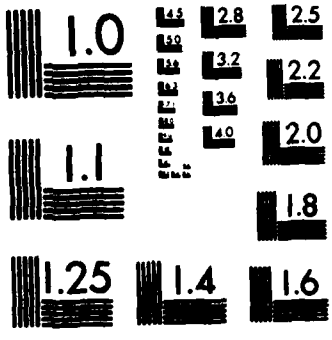
c) BREACH WIDTH (SEE NED-ACE P/G DAM FAILURE GUIDELINES)

$W_b = 0.4 \times 214 = 85.6'$ ASSUME $(W_b)_{b/a} = 85'$

*FROM SCS DWG N°. CN-424-P, SHEET #3, MAY 1960 AND C.E. FIELD OBSERVATIONS ON 5/1/80 BY HLL & R.J.

AD-A143 312 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
THAMES RIVER BASIN NO.. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 80

UNCLASSIFIED F/G 13/13 NL



d) ASSUMED WATER DEPTH AT TIME OF FAILURE: $(Y_o)_a = 27.5'$

e) SPILLWAY DISCHARGE AT TIME OF FAILURE: $(Q_s)_a = 490^{CFS}$ (See p. D-4)

f) BREACH OUTFLOW (SEE NED-ACE GUIDELINES)

$$(Q_b)_a = \frac{8}{27} W_b \sqrt{g}\, Y_o^{3/2} = 20600^{CFS}$$

g) PEAK FAILURE OUTFLOW (Q_{P_1}) TO SPAULDING POND BROOK.

$$(Q_{P_1})_a = Q_s + Q_b = 21090^{CFS} \quad \text{SAY, } (Q_{P_1})_a = \underline{21000}^{CFS}$$

3a) FLOOD DEPTH* IMMEDIATELY D/S FROM DAM:

$$Y_a = 0.44\, Y_o = 12.1' \quad \text{SAY, } Y_a = \underline{12'}$$

*(FROM RECREATING WAVE THEORY APPLIED TO DAM FAILURE)

4a) ESTIMATE OF D/S FAILURE CONDITIONS AT POTENTIAL IMPACT AREA (1,a-p D-5)

(SEE NED-ACE GUIDELINES FOR ESTIMATING D/S FAILURE HYDROGRAPHS)

a) THE (±)3000' LONG REACH OF SPAULDING POND BROOK FROM THE DAM TO THE POTENTIAL IMPACT AREA IS GENERALLY V-SHAPED WITH 3H AND 5H TO 1V SIDE SLOPES. THE AVERAGE REACH SLOPE IS (±)3.5%

b) RESERVOIR STORAGE AT TIME OF FAILURE:

$$S_{PMF} = 235^{AC-FT} \qquad S_{1/2} = 118^{AC-FT}$$

*C.E. ESTIMATE FROM S.C.S. DATA ON DAMS N° CN-422-P, SHEETS #1 & 2, MAY 1961. (SEE CURVE p. D-4)

c) APPROXIMATE STAGE AT POTENTIAL IMPACT AREA AFTER FAILURE:

$Q_{I_1} = 21000^{cfs}$ ∴ $Y_{1_2}^{*} = 15.6'$; $V_1 = 67.3^{ac\text{-}ft} \leftarrow S/2$ (REACH $L = 3000'$; $^{*}n = 0.050$)

∴ $Q_{I_2} = 15000^{cfs}$ ∴ $Y_2 = 13.8'$; $V_2 = 52.3^{ac\text{-}ft}$; $\bar{V} = 59.8^{ac\text{-}ft}$ ∴ $Q_{P_3} = 15700^{cfs}$; $Y_3 = 14.0'$

∴ REACH OUTFLOW $(Q_P)_{3a} = \underline{16000^{cfs}}$ $(Y_3)_a = \underline{14.0'}$

d) APPROXIMATE STAGE BEFORE FAILURE: $Q_s = \underline{490^{cfs}}$ $Y_s = \underline{3.8'}$

e) RAISE IN STAGE AT IMPACT AREA: $\Delta Y_a = \underline{10.2'}$

2b) FAILURE AT SPAULDING POND DIKE:

ASSUME SURCHARGE TO TEST FLOOD CONDITIONS (PMF – SEE p. D-9)
(ELEV. 247.5' NGVD)

a) HEIGHT OF DIKE*: $H_b = 18.5'$ (TOE ≈ ELEV. 232' NGVD)

b) MID HEIGHT LENGTH*: $\ell_b = 245'$

c) BREACH WIDTH (NED-ACE GUIDELINES):

$W_b = 0.4 \times 245 = 98'$ ∴ ASSUME $(W_b)_b = 98'$

d) ASSUMED WATER DEPTH AT TIME OF FAILURE: $(Y_w)_b = 15.5'$

e) BREACH OUTFLOW (SEE NED-ACE GUIDELINES):

$$(Q_b)_b = \frac{8}{27} W_b \sqrt{g}\, Y_w^{3/2} = 10000^{cfs}$$

*FROM S.C.S. DWG Nº CN-424-P, SHEET #4, MAY 1963 AND C.E. FIELD OBSERVATIONS ON 5/1/80 BY HLH & K.S.

f) PEAK FAILURE OUTFLOW $(Q_{P_1})_b$ TO D/S VALLEY.

$(Q_{P_1})_b = (Q_b)_b = \underline{10000}$ CFS

3$_b$) FLOOD DEPTH IMMEDIATELY D/S FROM DIKE

$Y_b = 0.44\,Y_o = \underline{6.8'}$

4$_b$) ESTIMATE OF D/S FAILURE CONDITIONS AT POTENTIAL IMPACT AREA (1.6-P.D-5).

(SEE NED-ACE GUIDELINES - D/S FAILURE HYDROGRAPHS)

a) THE POTENTIAL FLOODWAY OF THE SPAULDING POND DIKE IS A GENERALLY V-SHAPED VALLEY WITH 10" AND 20" TO 1' SIDE SLOPES. @ 1500' D/S, THE VALLEY DIVIDES FORMING TWO V-SHAPED CHANNELS WITH (LEFT) 60" AND 30" TO 1' AND (RIGHT) 30" AND 10" TO 1' SIDE SLOPES, RESPECTIVELY. THE AVERAGE FLOODWAY SLOPE IS (E) 3.5%. THE FIRST CHANNEL (LEFT) IS A POTENTIAL FLOODWAY TOWARDS THE BOLWELL ST AND SANDY LANE AREA. THE SECOND (RIGHT), IS A POTENTIAL FLOODWAY TOWARDS THE CURTIS RD. AREA.

c) APPROXIMATE STAGE AT POTENTIAL IMPACT AREAS AFTER FAILURE

i) D/S REACH ($L \approx 1500'$) - VALLEY.

$Q_{P_1} = 10000$ CFS; $Y_1^* = 7.2'$; $V_1 = 26.5$ FT/SEC ($\bar{n} = 0.050$)
$\therefore Q_{P_2} = 8900$ CFS; $Y_2 = 6.8'$; $V_2 = 24.2$ FT/SEC $\therefore \bar{V} = 25.3$ FT/SEC

$\therefore$ REACH OUTFLOW: $Q_{P_3} = 8900$ CFS ($Y_3 = 6.9'$)

ii) D/S REACHES (CHANNELS)

NEGLECTING CHANNEL STORAGE THE FLOW WILL DIVIDE APPROXIMATELY IN $(Q_{P_3})_{b,L} = \underline{6200}$ CFS (LEFT) AND $(Q_{P_3})_{b,R} = \underline{2700}$ CFS (RIGHT), BOTH

FLOWING AT (+) $(Y_3)_b \cong 4.0'$

e) RAISE IN STAGE AT IMPACT AREAS: $\Delta Y_b \cong 4.0'$

III) SELECTION OF TEST FLOOD

1) CLASSIFICATION OF DAM ACCORDING TO NED-ACE GUIDELINES:

a) SIZE: *STORAGE (MAX) $\cong$ 290 AC FT (50 < S < 1000 AC FT)
*HEIGHT $\cong$ 30.5' (25 < H < 40 FT)

*STORAGE - CE. ESTIMATE FROM SCS DATA ON DWGS NO. CN-S.24-P, SHEETS #1 & 2, MAY 1964
HEIGHT - SEE p. D-5 (DAM); (HEIGHT = 18.5' (p. D-7) - DIKE)

∴ SIZE CLASSIFICATION: SMALL

b) HAZARD POTENTIAL: AS A RESULT OF THE D/S FAILURE ANALYSIS AND IN VIEW OF THE IMPACT THAT FAILURE OF SPAULDING POND DAM/DIKE MAY HAVE ON THEIR POTENTIAL IMPACT AREAS (p. D-5), THE DAM/DIKE ARE CLASSIFIED AS HAVING:

HAZARD CLASSIFICATION: HIGH

2) TEST FLOOD PMF = 780 CFS

THIS SELECTION IS BASED ON THE RESULTS OF THE PREVIOUS ANALYSIS AND CLASSIFICATION.

Spaulding Pond Dam

IV) Summary:

1) Test Flood = PMF = 780 cfs

(Parallel computations have been made for ½ PMF = 390 cfs and are also summarized below)

2) Performance at Peak Flood Conditions:

a) Peak Inflows: $Q_{I_1} = PMF = 780$ cfs $Q'_{I_1} = \frac{1}{2} PMF = 390$ cfs

b) Peak Outflows: $Q_{B_1} = 490$ cfs $Q'_{B_1} = 140$ cfs

c) Spillway Capacity: (See Table p. D-4)

d) Performance:

i) At Test Flood: Freeboard (Dam/Dike) = (±) 3.0' (WS El. 247.5' NGVD)

ii) At ½ PMF: Freeboard (Dam/Dike) = (±) 3.8' (WS El. 246.7' NGVD)

3) Downstream Failure Conditions

a) Spaulding Pond Dam

i) Peak Failure Outflow: $(Q_p)_a = 21000$ cfs

ii) Flood Depth Immediately DS From Dam: $(Y_o)'_a = 12'$

iii) Conditions at the Initial Impact Area (Spaulding Pond Brook).

Stage Before Failure: $Y_3 = 3.8'$ ($Q_3 = 490$ cfs)

Stage After Failure: $(Y_3)_a = 14.0'$ ($(Q_{P_3})_a = 16000$ cfs)

Raise in Stage After Failure: $(\Delta Y)_a = 13.2'$

b) Spaulding Pond Dike:

i) Peak Failure Outflow: $(Q_p)_b = 10000$ cfs

ii) Flood Depth Immediately DS From Dike: $(Y_o)_b = 5.8'$

iii) Conditions at the Initial Impact Areas (Both Channels - see p. D-8)

Stage After Failure: $(Y_3)_b = 4.0'$ $(Q_{P_3})_{b,L} = 6200$ $(Q_{P_3})_{b,R} = 2700$

(No Flow)/Stage Before Failure)

PRELIMINARY GUIDANCE

FOR ESTIMATING

MAXIMUM PROBABLE DISCHARGES

IN

PHASE I DAM SAFETY

INVESTIGATIONS

New England Division
Corps of Engineers

March 1978

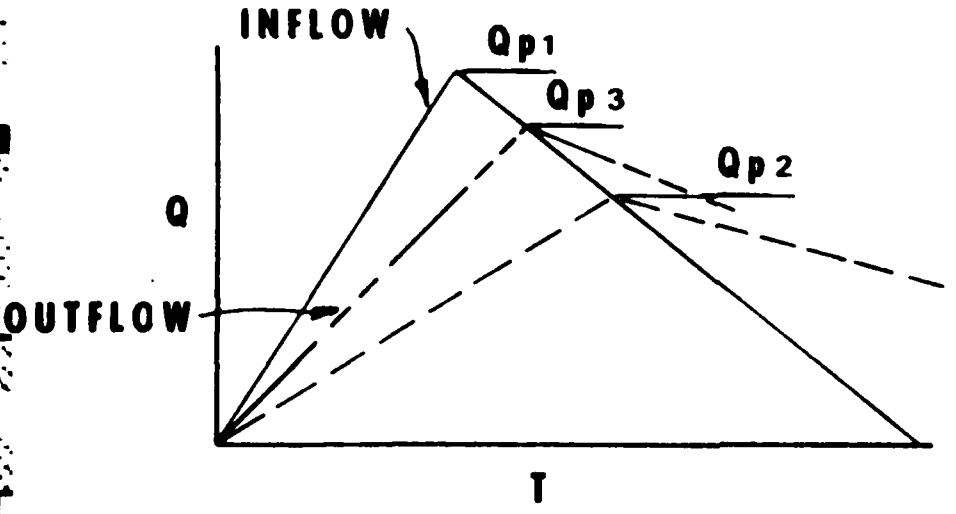
MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

	Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1.	Hall Meadow Brook	26,600	17.2	1,546
2.	East Branch	15,500	9.25	1,675
3.	Thomaston	158,000	97.2	1,625
4.	Northfield Brook	9,000	5.7	1,580
5.	Black Rock	35,000	20.4	1,715
6.	Hancock Brook	20,700	12.0	1,725
7.	Hop Brook	26,400	16.4	1,610
8.	Tully	47,000	50.0	940
9.	Barre Falls	61,000	55.0	1,109
10.	Conant Brook	11,900	7.8	1,525
11.	Knightville	160,000	162.0	987
12.	Littleville	98,000	52.3	1,870
13.	Colebrook River	165,000	118.0	1,400
14.	Mad River	30,000	18.2	1,650
15.	Sucker Brook	6,500	3.43	1,895
16.	Union Village	110,000	126.0	873
17.	North Hartland	199,000	220.0	904
18.	North Springfield	157,000	158.0	994
19.	Ball Mountain	190,000	172.0	1,105
20.	Townshend	228,000	106.0(278 total)	820
21.	Surry Mountain	63,000	100.0	630
22.	Otter Brook	45,000	47.0	957
23.	Birch Hill	88,500	175.0	505
24.	East Brimfield	73,900	67.5	1,095
25.	Westville	38,400	99.5(32 net)	1,200
26.	West Thompson	85,000	173.5(74 net)	1,150
27.	Hodges Village	35,600	31.1	1,145
28.	Buffumville	36,500	26.5	1,377
29.	Mansfield Hollow	125,000	159.0	786
30.	West Hill	26,000	28.0	928
31.	Franklin Falls	210,000	1000.0	210
32.	Blackwater	66,500	128.0	520
33.	Hopkinton	135,000	426.0	316
34.	Everett	68,000	64.0	1,062
35.	MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

	River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1.	Pawtuxet River	19,000	200	190
2.	Mill River (R.I.)	8,500	34	500
3.	Peters River (R.I.)	3,200	13	490
4.	Kettle Brook	8,000	30	530
5.	Sudbury River.	11,700	86	270
6.	Indian Brook (Hopk.)	1,000	5.9	340
7.	Charles River.	6,000	184	65
8.	Blackstone River.	43,000	416	200
9.	Quinebaug River	55,000	331	330

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Qp_1) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Qp_1".

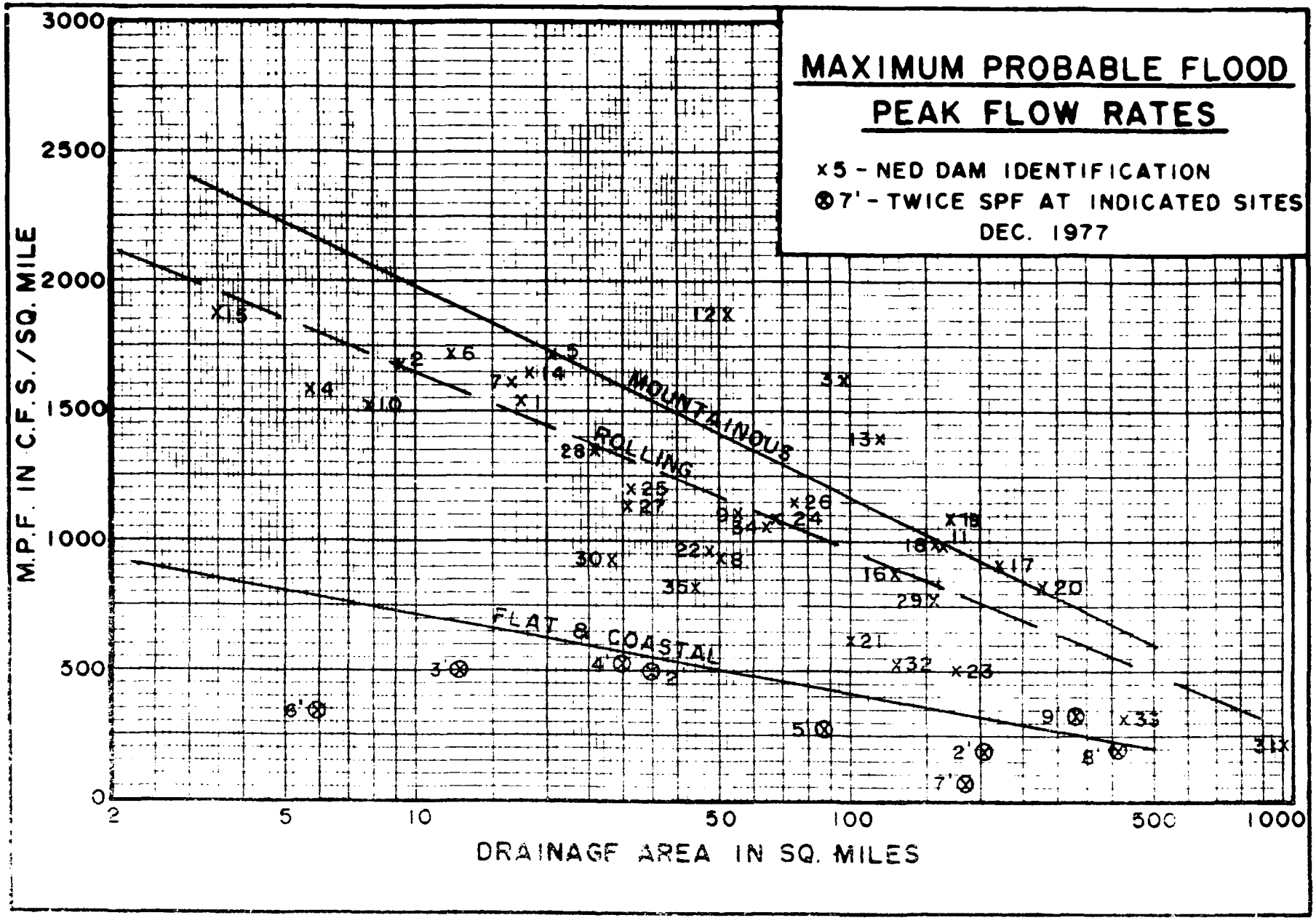
b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore:

$$Qp_2 = Qp_1 \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Qp_3".


MAXIMUM PROBABLE FLOOD
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SITES
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
DRAINAGE AREA IN SQ. MILES
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
1000
MOUNTAINOUS
ROLLING
FLAT & COASTAL

SURCHARGE STORAGE ROUTING SUPPLEMENT

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Avg "$STOR_1$" and "$STOR_2$" and Compute "Qp_3".

c. If Surcharge Height for Q_{p_3} and "$STOR_{AVG}$" agree O.K. If Not:

STEP 4: a. Determine Surcharge Height and "$STOR_3$" To Pass "Qp_3"

b. Avg. "Old $STOR_{AVG}$" and "$STOR_3$" and Compute "Qp_4"

c. Surcharge Height for Qp_4 and "New $STOR_{Avg}$" should Agree closely

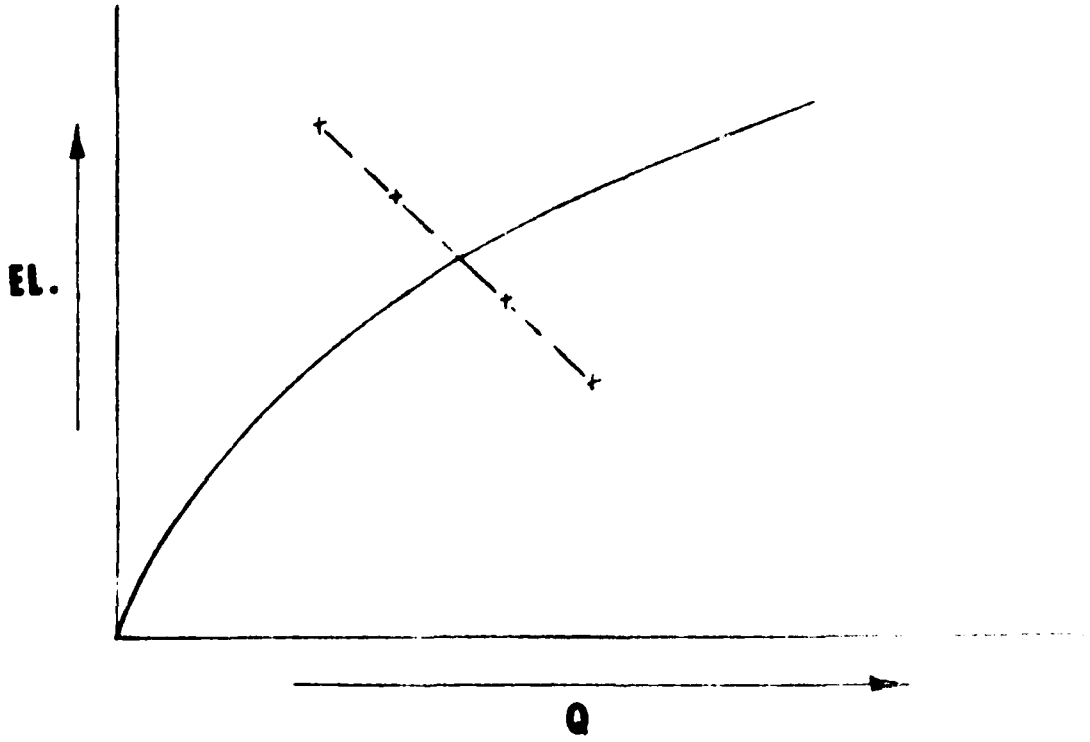
SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR}{19}\right)$$

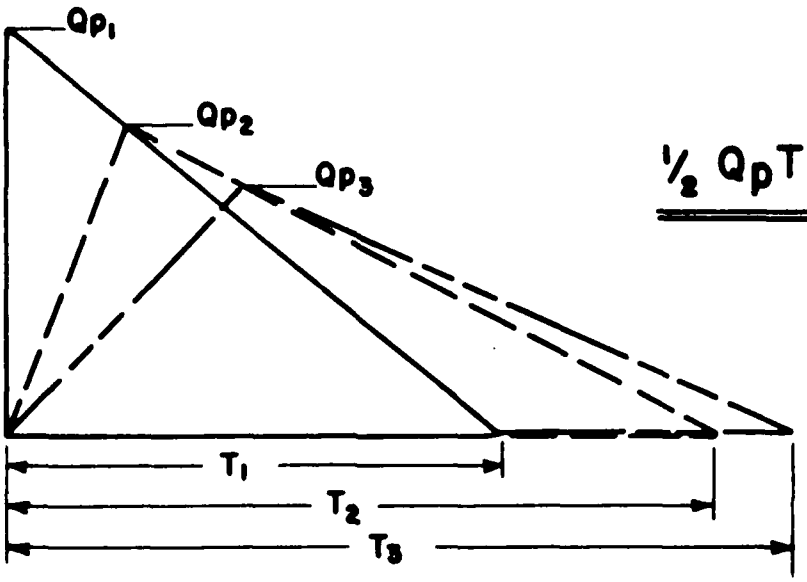
$$Q_{p2} = Q_{p1} - Q_{p1}\left(\frac{STOR}{19}\right)$$

FOR KNOWN Q_{p1} AND 19" R.O.

Q_{p2}	STOR	EL.



"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g} Y_o^{\frac{3}{2}}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Qp_2 = Qp_1 \left(1 - \frac{V_{ave}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
SPAULDING POND DAM, WEST	[illegible]	7204.2	[illegible]		

POPULAR NAME	NAME OF IMPOUNDMENT
	SPAULDING POND

NUMBER	NAME OF RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)	POPULATION
17	UNNAMED	NORWICH		42000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE - FT.)	NORMAL (ACRE - FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
RE	1964	R	28	24	149	109	VED					

REMARKS

DIST	SPILLWAY WIDTH	TYPE	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH	WIDTH	HEIGHT	LENGTH	WIDTH	LENGTH	WIDTH

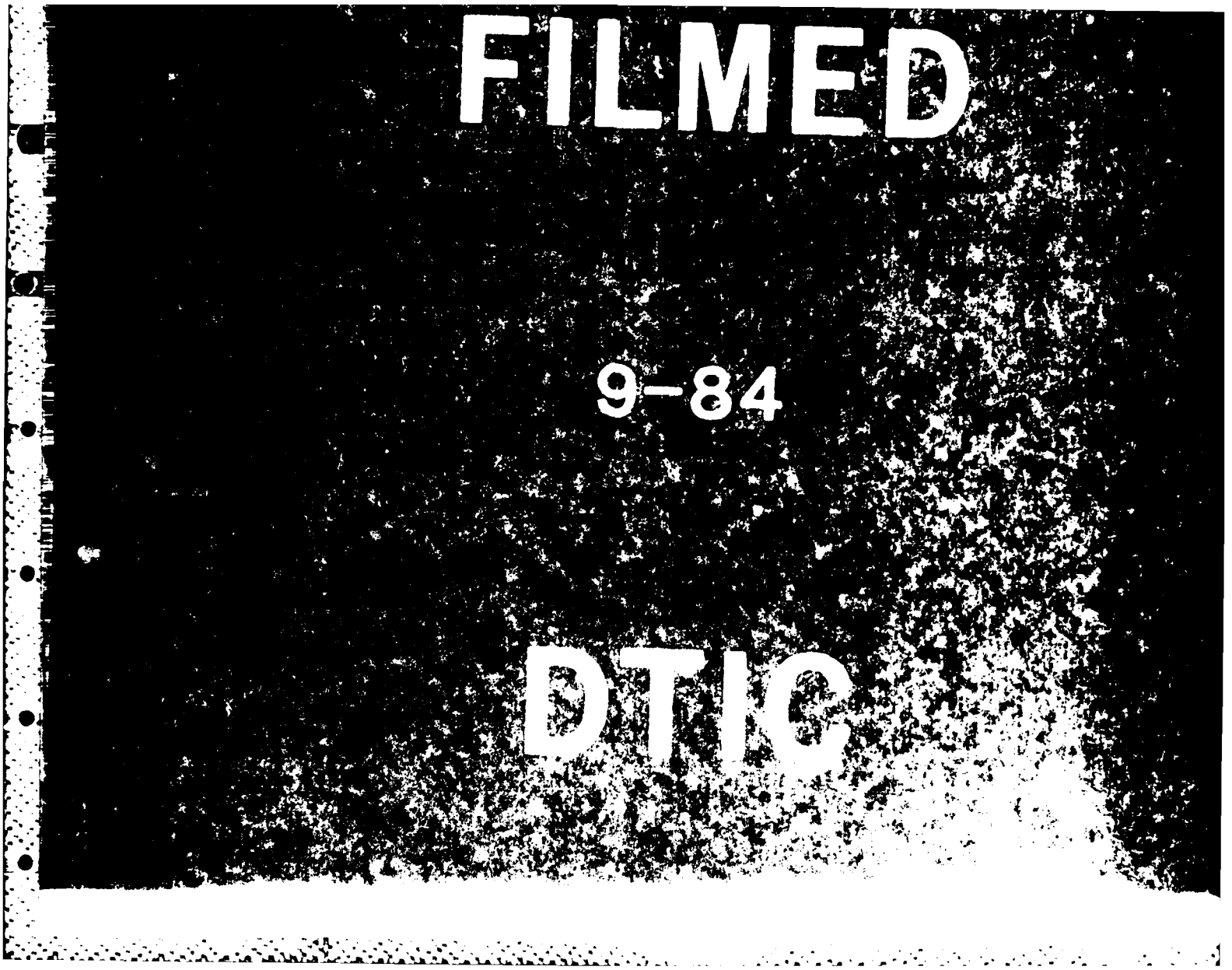
OWNER	ENGINEERING BY	CONSTRUCTION BY

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION

REMARKS

REPORTS CONTROL SYMBOL
DAEN – CWE – 17


FILMED
9-84
DTIC